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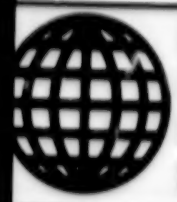

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JPRS Report

Science & Technology

USSR: Life Sciences

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Promotion of Biological Method of Plant Protection
18400114 Moscow ZASHCHITA RASTENIY in Russian No 9, Sep 88 pp 4-8

[Article by A. T. Gulenko, chairman of Soyuzselkhozkhimiya [All-Union Scientific Production Association for Agrochemical Services to Agriculture]: "Biological Method for Production"]

[Excerpt] [Passage omitted] In spite of the advantages of biological agents, their overall use in the world does not exceed 1 percent of pesticides, whereas in the USSR only 10 microorganisms are used as biological insecticides, although we know of more than 1,000 microorganisms that produce toxins which are effective in control of weeds or harmful insects. Most plant parasites have pathogenic organisms, and 100 bacterial species dangerous to harmful insects have already been identified. In addition to bacteria, viruses and fungi are used to control them. The chief flaws of biologicals are their instability, narrow spectrum of action and slow action. For this reason, the biological method is not yet solving all of the problems of plant protection, although it has a great future, since one can expand the range of action using biotechnology, by introducing into microorganisms additional genes, combinations of genes, amplification and cloning of toxins. Scientists of many countries are working at the present time on this problem, and some advances have been made.

It was recently reported in the press that U.S. scientists isolated 72 new strains that are active against harmful insects of the genus Lepidoptera. Among them are superproducers of toxic protein, one of which is 20 times more active than currently used, highly effective insecticides. This is indicative of the enormous possibilities, as yet undisclosed, of the biological method of plant protection.

Concurrently with development of effective biologicals, research is expanding on development of transgenic plants capable of withstanding harmful insects by synthesizing their own repellents. The Monsanto firm used genetic engineering to develop tobacco and tomato plants with the genes of insecticidal toxin. Analogous work has been done in the USSR by the staff of the Institute of Molecular Biology, USSR Academy of Sciences, and Institute of Genetics and Selection of Industrial Microorganisms.

Insects, mites, phytopathogens and nematodes are being studied for biological control of weeds. Biological agents that are useful in the control of 100 weed species have already been found.

On the basis of the search for new, beneficial strains of microorganisms and refinement of existing biologicals, it can be assumed that their broader use will begin in 5-10 years. In this time, it will expand from 1 to 10-15 percent in the United States.

The potential of biological agents for plant protection was determined in the USSR earlier than in other countries. For this reason, our country is presently in the lead in scientific developments and scope of their practical use. The share of biologicals already constitutes about 20 percent of all pesticides used for control of agricultural plant pests and diseases.

In brief, there is no longer a need to argue the case for the biological method; at present it is important to make the utmost use of existing scientific, technical and production potential, and it is already solid.

Scientific work on this problem is being pursued in our country in more than 30 institutes of the USSR Academy of Sciences, All-Union Academy of Agricultural Sciences imeni Lenin, USSR Gosagroprom [State Committee of the Agricultural Industry] and the USSR Ministry of the Medical and Biological Industry. This year, the Biozashchita Scientific Production Association was established in Kishinev, the Biotekhnika All-Union Scientific Research Center was opened in Odessa, production and scientific-production systems dealing with the biological method are being organized in all union republics.

There are 1,500 biological laboratories and biological factories, two plants of the USSR Ministry of the Medical and Biological Industry, as well as scientific research institutes and their experimental farms engaged in the production of biological agents for the protection of plants. USSR Gosagroprom organizations are producing 14 entomophages and 12 species of microorganisms. The Ministry of the Medical and Biological Industry is producing four bacterial agents. For example, Trichogramma, Habrobracon, Pseuda-phycus, lacewing [Chrysopidae] and Phytomysa are used in open soil; Phytoseiulus, Encarsia, industrially produced dendrobacillin, bitoxybacillin, lepidocid, gomelin and others are used in covered ground. Thus far, such promising entomophages and biologicals as metaseiulus, nephus, gall midge, aphidius, ambliseius, trichodermin and verticillin have not found broad use.

The range of using the biological method depends largely on the initiative and activity of specialists in plant protection. For example, it is used over about 58 percent of the farmed area in Astrakhan Oblast, but only over 5 percent in Volgograd Oblast, over 21 and 10 percent in Bashkir ASSR and Orenburg Oblast, respectively, 40 and 16 percent in Kabardino-Balkar ASSR and Dagestan ASSR. The biological method is used considerably less than it could be in Kaliningrad, Saratov, Orlov, Rostov, Kirov, Chelyabinsk, Kherson, Donetsk and Rovno oblasts, as well as Krasnodar Kray and particularly in the Sochi and Anapa resort zones.

Biological methods of protection are used in 6 and 8 percent of the farmed areas of Belorussia and Georgia. The farms in Georgian SSR have established a network of production biolaboratories and outfitted them with the necessary equipment, but they did not set up efficient use of capacities, and

assignments are only 80 percent fulfilled. Great inertia in this matter is observed in Belorussian SSR. This republic does not have a material-technical base or personnel for the production of biologicals. Oblast and republic-level agroindustrial committees underestimate the significance of the biological method. In particular, insufficient use is being made there of industrial biologicals. In spite of orders issued by the USSR and BSSR Gosagroproms, biomethod teams have not yet been formed at oblast agroindustrial committees or the Belselkhozkhimia [Belorussian Scientific Production Association for Agrochemical Services to Agriculture].

There has been virtually no development of the biological method in Lithuania, Latvia or Estonia. This is attributable, to some extent, to adverse weather conditions, but chiefly to the passivity of agroindustrial committees, plant protection services and scientific institutions. Sad as it may be, there are no scientific divisions dealing with problems of the biological method in the Baltic republics. The Latvian Gosagroprom, under the pretext of reducing the administrative-management system, eliminated Latselkhozkhimiya [Latvian Scientific Production Association for Agrochemical Services to Agriculture] and the Latvian biological laboratory, which was the only division for the biological method in this republic, as of 1 June 1988. The attitude toward biological plant protection is no better in Lithuanian SSR and Estonian SSR. In 1987, biologicals were used over only 1,500 ha in Lithuania and 400 ha in Estonia. Unfortunately, there are no changes for the better in this respect in Armenia (the share of biomethod use does not exceed 1 percent), where there is already a rather good scientific base and, moreover, weather conditions are favorable.

Irresponsibility in solving problems of environmental protection often exceeds all bounds. A biological factory has been under construction for more than 10 years in Rostov Oblast. Only 50,000 rubles of the allocated 475,000 have been used there. Since 1972 there has been no answer to the question of constructing a biological laboratory in Volgograd Oblast. Over the years, planning estimates have been revised three times, 70,000 rubles have been spent, but this facility never has been included in a construction plan. The biolaboratory building was given up to organize a PMK [expansion unknown] in Kherson Oblast. Construction of biological factories in Gorkiy, Yaroslavl, Kursk, Vladimir and several other oblasts has been going on for many years.

For a long time, use of chemicals was the principal method of protecting plants against pests, diseases and weeds in cotton-growing and other branches of agriculture in republics of Central Asia, Kazakhstan and Azerbaijan. Crop dusting was often performed without consideration of the extent of contamination of the crops. This resulted in development of pest resistance, and an increase in frequency of spraying, impairment of biological balance of ecosystems, and environmental pollution. Since the ecological situation has become more acute in recent years, steps are being taken in these republics to prevent the adverse effects of pesticides on the environment. Pests are exterminated primarily by the surface method. Pesticide use for control of cotton-plant pests constituted 55,600 tons in 1980 (without use of sulfur-containing agents) and 7,500 tons in 1986 (7.5 times less). Much attention is given to development of alternative procedures for plant protection.

Biologicals are being used actively in Uzbek SSR (over an area of 5.3 million ha), Turkmen SSR (476,000 ha) and, to a lesser extent, in Kazakh SSR (360,000), Azerbaijan SSR (327,000), Kirghis SSR (220,000) Tajik SSR (80,000). Biological agents for plant protection constituted 6 percent of all measures against pests and diseases in Turkmenia, 62 percent in Uzbekistan, 30 percent in Kirghizia, 10 percent in Tajikistan, 8 percent in Azerbaijan and 7 percent in Kazakhstan.

In these republics, biologicals are used the most extensively on cotton plants (annual average about 5 million ha). They are used much less for vegetables and cucurbits (200,000-300,000 ha) and corn. There is slow introduction of bioprotection for orchards and vineyards. Biological agents are virtually unused in hothouse and greenhouse farming in the region. As a result, covered soil has become the source of spread of such a dangerous pest as the whitefly, which is inflicting increasing damage to open soil crops (cotton and vegetables in Turkmenia and, in part, in Uzbekistan). In 1983, cotton fields were sprayed with pesticides an average of 1.9 times each in Uzbekistan, versus 0.8 in 1987. A large network of production biolaboratories and biofactories was established; work has begun on protection of naturally occurring entomophages; entomological micropreserves and microsanctuaries have been created. In this respect, good examples have been demonstrated in Namangan, Syr-Darya, Dzhizak oblasts and several other regions. On-going instruction is offered to specialists in use of the biological method at the Tashkent Institute of Agriculture, as well as classes for electricians on servicing biolaboratory equipment at the intersector educational center of the USSR Gosagroprom.

However, due attention to biological protection of plants is not being given in all parts of Uzbek SSR. For example, there is slow expansion of this progressive method and use of chemicals is not diminishing in Kalininskiy and Ordzhonikidzevskiy rayons of Tashkent Oblast, which produce primarily fruit and vegetables, Navoi Oblast and Kara-Kalpak ASSR. Equipment is being used inefficiently. Line productivity is half the national level and one-third of the level at progressive biofactories.

More than half of all the nation's mechanized lines for breeding Trichogramma are installed in Uzbekistan, but they are used to only 30-35 percent capacity because the technology isn't used properly. The jobs of biolaboratory and biofactory chiefs are not always held by specialists; many biolaboratories and biofactories are not heated in the winter, so that they cannot operate the year round.

Recently, there has been a decrease in volume of microbiological agents used in Central Asia for plant protection. One of the reasons is that there is not sufficient popularization of biologicals and the technology of their use is flawed. As a result, large amounts of unused products remain at the warehouses. In Turkmenia, for example, they had to be written off in 1987 at a cost of about 143,000 rubles. In that republic, work is being done poorly in the area of bioprotection of plants in hothouse-greenhouse combines. There is delay in forming a republic-level biolaboratory, while others are located in converted facilities; Trichogramma breeding is not mechanized everywhere. The technology for breeding Trichogramma was not properly used at the Turkmenistan Soviet (Ashkhabadskiy Rayon) and 40th Anniversary of Turkmen SSR collective farms.

In Azerbaijan SSR, all production biolaboratories are specialized only on Trichogramma production. We believe that it is imperative to set up production of Habrobracon, Phytoseiulus, Encarsia, trichodermin, verticillin and to make broader use of industrial biologicals. The data prepared by this republic's station dealing with the organization of 3-4 additional biolaboratories, expanding the list of biologicals and mechanizing Trichogramma production in existing biolaboratories did not find support in the republic's Gosagroprom.

There are instances of chemical treatment of crops immediately after use of Trichogramma. The question of organizing biolaboratories in hothouse-greenhouse combines has not been resolved.

The Azerbaijan Scientific Research Institute of Plant Protection is providing poor methodological supervision; it is not well-linked to production and has not proposed any scientific projects pertaining to this subject.

Quite a few shortcomings were found in Kazakh SSR. The biomethod is underestimated in Guryev, Dzhizak and Kzyl-Orda oblasts; the material and technical base is weak, and the laboratories are not fully manned. Production biolaboratories of this republic are not receiving adequate scientific and methodological assistance from scientific research institutes. Attention is not being given to developments with practical importance, or technology for efficient use of biologicals; the Kazakh Scientific Research Institute of Plant Protection, Institute of Fruit-Growing and Viticulture of the Kazakh Gosagroprom must expand investigations of these questions. It would be desirable to involve the Institute of Microbiology and Virology and the Institute of Zoology of the Kazakh Academy of Sciences in solving the problem of development of the biological method.

Things are better in Kirghizia, particularly Osh Oblast and certain other rayons (Alamedinskiy, Sokulukskiy and Chuyskiy). Bioprotection is practiced insignificantly in Talas and Issyk-Kul oblasts. The fact that the Kirghiz Scientific Research Institute of Agriculture, which is engaged in such matters, has not recommended a single new biological agent or technology for its production and use in the last 10 years is also a reason for the lack of progress in this area.

In Tajik SSR, conditions have been provided for stable and dynamic development of the biological method. But they are not being used sufficiently. There, cotton and vegetable crops are sprayed with pesticides very frequently, whereas the biological method is virtually not used in orchards and vineyards. This republic was the last to undertake establishment of a network of biolaboratories; only 3 out of 16 types of biological agents are used. In the last 5 years, not a single entomophage or biological agent was adopted in plant protection practice. In the last few years, there has been a drop to one-tenth the former level in use of industrial biologicals: from 19,000 ha in 1981 to 1,600 ha in 1987. Zonal recommendations on use of biologicals, which were prepared by the Tajik Scientific Research Institute of Agriculture never were put into practice.

We should indicate several objective reasons that are delaying expansion of use of biologicals. First of all, it is their poor quality and technological qualities. It is known that the plants of the USSR Ministry of the Medical and Biological Industry are well-equipped. However, the agents they produce are inferior to even the worst pesticides produced in our country. This prompts constant reproaches on the part of the farms and, of course, diminishes interest in broadening their use. Repeated suggestions of the USSR Gosagroprom to adopt state or departmental acceptance standards of biologicals have thus far failed to be supported by the USSR Gosstandard (State Committee for Standards] and the USSR Ministry of the Medical and Biological Industry. It is the second year that departmental correspondence on this subject is going on, but the Ministry of Medical and Biological Industry remains apathetic in this important problem.

Producers are also dissatisfied with the list of biologicals supplied by this ministry. Of the 14 items that were to be produced, only 4 have been put into production. Fungal and viral agents and antibiotics, which could expand appreciably the use of the biological method for grain, soybeans and rape crops, are not being produced. It should be noted that numerous scientific institutions that have become involved in solving this extremely important problem have not displayed due activity, although it is believed that they are working at the leading edge of current problems.

Unfortunately, in recent years we have clearly started to give up our leading position in the area of the biological method in our country. It is only because of the apathy of scientific institutions that there are no safe agents for the control of diseases of farm crops in open soil. Virtually no research is being done on biological control of weeds. There are almost no biological agents for suppression of sucking pests, mites and aphids. Pesticide-free technologies have not been developed for resort and water-protection zones; there is no

proper coordination of scientific research and experimental design dealing with the biomethod. There is much parallelism and duplication in investigations of the biomethods; several pressing problems are being worked on extremely slowly and by few people.

The material-technical and experimental base for scientific and planning-construction organizations concerned with the biomethod is still very poor. Nor has the situation improved with respect to development of research complexes; the biomethod for some reason has not been singled out as an independent problem.

The staff of the USSR Ministry of Civil Aviation, the USSR Minpribor [Ministry of Instrument Making, Automation Equipment and Control Systems] and the USSR Ministry of the Electronics Industry have an obligation to plant protection workers. Each year, the aviation people are supposed to produce at their own enterprises 50 sets of equipment for dissemination of Trichogramma. This is not a difficult problem, but for some reason it is not being solved. It is also time to consider production of equipment for other biological agents.

The Mikond plant accepted an order from the USSR Gosagroprom to produce 60 mechanized lines per year for the production of Trichogramma. We cut down our production, but the plant did not fulfill its obligations and is delivering no more than 30-35 lines per year to the biofactories. The USSR Minpribor has not yet provided the necessary instruments and equipment to enterprises of USSR Gosagroprom.

The biological method is acquiring particular importance in covered soil. The specific microclimate, limited species and cultivars raised and other factors cause accumulation and spread of a number of harmful organisms, primarily, the spider mite, whitefly, aphids, powdery mildew and root rot, which often leads to loss of harvest in the absence of protective measures. Pesticide treatment is performed 15-20 times per vegetation period in hothouse combines, as a result of which there is formation of resistant populations of pests and diseases, agricultural products are contaminated and there is worsening of sanitary and hygienic working conditions. Since most of the products raised in covered soil are used fresh, a goal has been set of changing completely over to biological plant protection within 2 years.

At the present time, more than 20 biological agents, including 9 entomophages and 9 microbiologicals, have been recommended for hothouse-greenhouse farming; effective methods have been developed and approved for the control of the principal pests of farm crops and vaccination of tomatoes against tobacco mosaic virus.

Biological plant protection in covered soil has undergone successful production testing in all parts of our country. It was proven that one can protect crops and make an economic gain using safe agents. At the Minsk Hothouse Vegetable Factory, for example, the biomethod has been used since 1975, and the technology of protecting cucumbers has been mastered. This has made it possible to harvest a clean crop and increase the yield by a mean of 4.21 kg per square meter.

At the Kievskaya Ovoshchnaya Fabrika [Kiev vegetable factory] and Sovki collective farms in Kiev Oblast, first rotation tomatoes and cucumbers have been grown without pesticides for the last 4 years.

The biomethod is being used with great efficiency at the following collective farms: Teplichnyy in Sakhalin Oblast, Krasnoyarskiy in Krasnoyarsk Kray, Sverdlov collective farm in Slobodzeyskiy Rayon of Moldavian SSR, Prigorodnyy in Voronezh Oblast, Omskiy in Omsk Oblast, Belaya dacha and Zarechye in Moscow Oblast; as well as at the Leto firm in Leningrad Oblast and several other places. On the average, the use of biologicals throughout the country, as opposed to chemical protectants, saves 10,000 to 16,000 rubles/ha.

In recent years, the biological method developed at a fast pace in hothouse-greenhouse farming. In 1987, it was used on 13,600 ha in the USSR (this is 20 percent more than in 1986) and 10,500 ha in the Russian Federation. In 15 years, there has been more than a 13-fold increase in use of biologicals in hothouses. In Kazakh SSR, biolaboratories have been formed in half the hothouse farms. Production of Phytoseiulus, Encarsia, fungal agents and others is being set up.

At the same time, there is still predominant use of pesticides in Belorussian SSR, the Tula and Orenburg oblasts, Mari ASSR, Khabarovsk Kray, at the Yuzhnyy collective state farm in Stavropol Kray, the Dzerzhinskiy collective farm in Moscow Oblast, several state farms in Sochinskiy Rayon of Krasnodar Kray and other hothouse combines.

In Georgian SSR, biologicals started to be used in hothouses only in 1987, and even then on a very modest scale. This republic is at least 20 years behind, since widespread adoption of the biomethod in covered soil began in our country in 1967. In order to meet the established goal, Georgian SSR must develop production, train personnel and solve a number of other urgent problems within 2 years.

The situation is similar in Armenia. This republic cannot advance beyond the 1975 level; as before, only two entomophages are used there per 50,000-60,000 m^2 of hothouses, or else only 1 percent of the necessary work is being done.

In Latvian SSR, there was a dramatic reduction in use of biologicals on covered soil in 1987, when it constituted 67 percent of the 1986 level. The situation is also extremely unsatisfactory in Central Asian republics.

We could continue with the list of negative examples, but obviously the facts we have mentioned are sufficient to draw appropriate conclusions, and we hope this will be done. The

change of hothouse-greenhouse farms to biological protection of plants requires radical change in attitude toward this problem. It is imperative to rapidly establish and outfit laboratories at all of the major hothouse combines, to build 250 new biolaboratories and renovate 170 existing ones, and there must be an immediate solution to the problem of financing the work.

In order to expedite development of the biological method of plant protection, the USSR Gosagroprom issued an order in October 1987, which provides for a set of steps aimed at strengthening scientific and production divisions. As shown by analysis, fulfillment of this order is proceeding in an unsatisfactory way thus far, and in some republics the attitude toward it is simply irresponsible. The assignments have still not been submitted to relevant workers in Latvia, Azerbaijan and Turkmenia. Neither an experimental testing division nor an education and training center has yet been organized at the Biozashchita Scientific Production Association nor has there been a solution to the problem of establishing the necessary base for an introduction department or of the specialization of individual repair enterprises in the production of biological equipment. Additional funds for expansion of research on the biological method have been allocated to only one out of nine institutions, the Leningrad Institute of Agriculture (50,000 out of 346,000 rubles). While forming regional systems of scientific support of agroindustrial complexes, it is necessary to correct the situation, for it would be difficult to expect a return from science without investing funds for its development. The situation is analogous with respect to development of production capacity of biolaboratories and biofactories.

One possibility for expanding bioprotection is to upgrade the organization of production of biologicals on the basis of adopting cost accounting, development of economic relations, specialization and cooperation of enterprises, intensification of integration of scientific and production divisions.

In 1986, the USSR Gosagroprom recommended, as a model of production on the oblast or kray level, the Cherkassy Biofactory, which established 20 production divisions, assembled 11 lines for Trichogramma breeding, constructed housing and cultural and recreational centers in the last few years. This factory has an output of almost 1 million rubles per year. Net profit in 1987 was 344,000 rubles. Last year, more than 870,000 ha were treated by the biomethod in Cherkassy Oblast. On the basis of the year's performance, enterprise workers received bonuses totaling 82,00 [as printed] rubles, an average of 1.5 times the wages per person. Unfortunately, this knowhow is being adopted elsewhere very slowly, and virtually all biological enterprises are supported entirely by the state.

Establishment of republic-level "Biometod" production systems (RPS) is proceeding slowly. Many republics have not begun such work. We believe that organization of Biometod RPS's is the most promising means of developing production of biologicals and their effective use. The system would enable integrated scientific-technical production and use of biological agents on the basis of cost accounting, concentration of the necessary material and technical resources and capital investments, organization of special training and retraining of personnel, which is virtually impossible to accomplish at an individual enterprise.

It was stressed at the 19th All-Union Conference that the top priority tasks include activation of efforts to protect the environment and to make cardinal improvements of the ecological situation in our country. The biological method has a great potential, particularly when used in conjunction with other procedures, and it is one of the realistic means of improving the ecological situation and making wise use of natural resources. This is why attention must be constantly given to its development, it must be given priority, and assistance must be given to production systems in order to reach the goal that has been set.

Effect of Superhigh Doses of γ-Irradiation of Pollen on Genetic Variability of Corn

18400281 Kishinev IZVESTIYA AKADEMII NAUK MOLDAVSKOY SSR: SERIYA BIOLOGICHESKIKH I KHIMICHESKIKH NAUK in Russian No 5, Sep-Oct 88 (manuscript received 18 Dec 87) pp 32-35

[Article by I. M. Romanova and V. N. Lysikov, Institute of Ecological Genetics, MSSR Academy of Sciences]

[Abstract] The researchers studied the possibility of producing transformations and mutations by pollinating inbred lines of corn with pollen exposed to high doses of γ-radiation. The two component donor-recipient system was used, with the P 346 inbred line of corn serving as the recipient, and the marker lines of K 167 bm_2 and $SU_1(1)S_4bm_2g_1$ serving as the donor. The pollen was exposed to 30-1500 Gy of γ-radiation. The pollen grains germinated poorly after irradiation or not at all (at 1500 Gy). Hybrid seeds were produced with the pollen irradiated at 30 Gy. Increasingly poorer results were obtained with increasing levels of irradiation. Pollination with the irradiated K 167 bm_2 produced 3 grains at 200 Gy and 7 grains at 300 Gy (the seeds did not produce shoots in germination). Pollination with the other marker line produced no grains in the recipient line. The authors conclude that high doses of irradiation lead to the production of individual grains, but the seeds do not germinate. References 6 (Western).

UDC 582.572.225

Biological Activities of Cibulins (Onion Phytoalexins)

18400246b Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR. SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 10, Oct 88 (manuscript received 24 Aug 88) pp 64-67

[Article by A. P. Dmitriyev, Yu. P. Fedorenko, A. V. Ruban, S. M. Kochubey and D. M. Grodzinskiy, corresponding member, UkSSR Acad. Sci., Institutes of Botany and of Plant Physiology and Genetics, UkSSR Academy of Sciences, Kiev]

[Abstract] Phytoalexins (cibulins) isolated from the nec-

trotic tissues of Strigunovskiy and Oktyabr onions were tested for the spectrum of their antifungal and phytotoxic activities. When tested on Botrytis allii, B. cinerea, and Fusarium solani, the antifungal activities of the cibulins became evident in inhibition of spore germination and hyphal elongation. The ED_{50} ranged from 12-37 μg/ml, with complete inhibition seen with levels of 180-250μg/ml. Evidently, the levels encountered in necrotic tissues (500-700 μg/gm) are quite sufficient for a lethal effect on fungi. In addition, the specific onion pathogen B. allii was not found to be unduly tolerant of cibulins, suggesting that its pathogenicity rests on early and rapid invasion of the plant tissues and inhibition of protective reactions. Trials with wheat coleoptiles demonstrated that the cibulins, in concentrations of 25 and 50 μg/ml, inhibited cell division and elogation by, respectively, 15 and 39 percent. Furthermore, addition of cibulins (10-20 μg/ml) to pea chloroplast preparations was shown to inhibited photosynthesis by 60-80 percent, evidently by promoting transformation of photosystem 2α into 2β. Figures 21; references 10: 7 Russian, 3 Western.

UDC 577.25+577.212.3

Cloning and Structural Analysis of Human Neuroleukin Gene cDNA

18400210a Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 303 No 5, Dec 88

[Article by A. N. Shakhov, R. L. Turetskaya and S. A. Nedospasov, Institute of Molecular Biology imeni V. A. Engelgardt, USSR Academy of Sciences, Moscow]

[Abstract] The recent demonstration that mouse neuroleukin (NLK) is identical to glucose-6-phosphate isomerase and, furthermore, that it is homologous with the conservative region of AIDS virus glycoprotein gp120 led to a study on the human gene coding for NLK. Cloning of the human cDNA involved conventional techniques of genetic engineering, using a subclone of the mouse NLK gene DNA as a molecular probe for screening cDNA prepared from mRNA derived from human brain and phytohemagglutinin activated T-cells. In both cases a multitude of positive signals were obtained, pointing to the efficient transcription of the human NLK gene in brain tissue and human T-cells. Screening of some 200,000 recombinant clones led to selection of 7 clones containing inserts ranging from 0.5 to 1.4 kb. The longest insert sequence (1.4 kb) was recloned into plasmid pGEM4 and then into pGEM3/4. Comparison with the known sequence for mouse NLK cDNA showed that the insert in question corresponded to an extended NLK cDNA without the 5'-terminal sequence, coding for approximately 400 amino acids, including the C-terminal end. Further cloning led to establishment of the 5'-end fragment. The human NLK (559 amino acids) showed a high degree of homology with the murine NLK (558 amino acids), with a difference in only 65 amino acid positions. Comparison of the human and murine cDNAs revealed that only the protein-coding sequences were homologous, whereas considerable differences were encountered 3'-nontranslatable region. Blot hybridization studies demonstrated that the human genome contains only NLK gene, whereas several hybridizing bands were evident in the mouse analysis. Figures 2; references 11: 1 Russian translation; 10 Western.

UDC 577.32

Interaction of Melittin with Phospholipid Bilayer: 'Surface' and 'Internal' Protein Shapes

18400214a Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR. SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 11, Nov 88 (manuscript received 20 May 88) pp 67-70

[Article by A. S. Ladokhin, Ye. G. Kostrzhevskaya and A. P. Demchenko, Institute of Biochemistry, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] The fact that the fluorescence of the single tryptophanyl moiety (trp-19) of melittin may be used to monitor the conformational state of the peptide was used to follow the interaction of melittin with phospholipid bilayers. Melittin exists as a monomer in solution of low ionic strength and as a helical tetramer and at high ionic strengths. Analysis of the temperature effects on the fluorescence of melittin upon interaction with liposomes prepared from dimyristoylphosphatidylcholine at temperature of 8 to 48 degrees C, as well as fluorescence quenching with I^-, showed that the structure of the lipid-protein complex was dependent on the ionic strength of the solution. The data were consistent with the presence of two classes of tryptophanyl moieties, indicating that the monomers and tetramers formed different complexes with the liposomes. In one case the trypotphanyl moiety was externalized, and in the other internalized. The accessibility of the internal and external trypotophanyl moieties to the quenching agent differed by more than an order of magnitude. An inflection point at 23 degrees C in the fluorescence measurements was thus correlated with redistribution of the protein conformations (at t_m more internal tryptophanyls, at $t_{m'}$ more external tryptophanyls). Figures 2; references 7: 1 Russian, 6 Western.

UDC 577.1:615.919:598.126

Structure of Antigenic Determinants of Cobra Venom Neurotoxin II

18400215a Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 4, Jul-Aug 88 (manuscript received 12 Feb 88) pp 608-608

[Article by B. Z. Dalimov, A. R. Nuriddinov, Sh. K. Kasymov and Sh. I. Salikhov, Institute of Bioorganic Chemistry, Uzbek SSR Academy of Sciences, Tashkent]

[Abstract] Neurotoxin II (NT-II), derived from the venom of the cobra Naja naja oxiana, was subjected to reduction with dithreitol and tryptic digestion in order to obtain fragment suitable for antigenic analysis. Binding studies with rabbit antisera directed against NT-II demonstrated that the antigenic epitopes were located on the following peptide sequences: Leu^1-Lys^{15}, Tre^{16}-Lys^{25}, Gly^{33}-Arg^{38}, and Pro^{47}-Arg^{55}. References 8: 4 Russian, 4 Western.

UDC 577.11:547.964.4.07

Synthesis of Somatostatin Gene Fragments

18400215b Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 4, Jul-Aug 88 (manuscript received 23 Nov 87) pp 614-616

[Article by A. A. Shishkina, Ye. A. Guseva, V. A. Karpov, V. G. Lunin, T. A. Avdonina, Yu. N. Tikhonov, She Midon, Yu. P. Shvachkin and Yu. A. Pankov, Institute of Experimental Endocrinology and Hormone Chemistry and the Scientific Research Institute of Medical Enzymology, USSR Academy of Medical Sciences, Moscow; All-Union Scientific Research Institute of Agricultural Biotechnology, All-Union Agricultural Academy imeni Lenin, Moscow]

[Abstract] Cursory details are presented on chemical synthesis of nucleotide fragments representing overlapping sequences of the somatostatin gene. A total of 10

segments were synthesized in the 3'-5' direction using the block phosphotriester approach, commencing with N-benzoyl-2'-deoxy-3'(p-chlorophenyl)nucleotides as the OH components and 5'-dimethoxytrityl-N-benzoyl-2'-deoxynucleoside-3'-(p-chlorophenyl)phosphates as they P component. Condensation was effected with 2,4,6-triisopropylsulfotetrazolide. The yields were on the order of 45 to 85 percent, depending on the length and composition of the blocks. Studies are under way on ligating these fragments into a complete gene for eventual cloning. References 5: 1 Russian, 4 Western.

UDC 577.150.3:591.145.2:615.919

Toxic Components of Vespa Orientalis Venom
18400215c Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 4, Jul-Aug 88 (manuscript received 2 Nov 87; in final form 28 Mar 88) pp 616-617

[Article by M. U. Tuychibayev, I. S. Yakubov, U. Z. Mirkhodzhayev, A. S. Korneyev, Zh. A. Abdurakhmanova, Sh. I. Salikhov, M. M. Rakhimov and B. A. Tashmukhamedov, Institutes of Biochemistry and of Bioorganic Chemistry, Uzbek SSR Academy of Sciences, Tashkent; Tashkent State University imeni V. I. Lenin]

[Abstract] Chemical analysis has shown that the venom of the Vespa orientalis hornet contains two lipases, lysophospholipase A_1 (orientotoxin-I [ORT-I] and phospolipase A_2 (orientotoxin II [ORT-II]. A comparison of ORT-I and -II shows both similarities and differences in their physicochemical characteristics. Among the similarities are rather close LD_{50} values for an unspecified species (I = 0.5 μg/kg; II = 0.65 μg/kg), identical N and C terminal amino acids (phenylalanine and lysine, respective), close molecular weights (16, 15 kD), and close R_f values. However, the tabulated data also show differences in for example substrate specificity (lyso-lecithin for I and lecithin for II). Michaelis constants, pH optima, temperature optima, optimum Ca ion concentration for enzymatic activity, specific activities, and surfactant activities. The differences in the functional characteristics of ORT-I and ORT-II may provide valuable insight into the relationships among structural, catalytic, and toxic properties of lipolytic enzymes. References 2 (Russian).

UDC 542.91:615.779.9

Identification of Enniatins Produced by Fusarium Gibbosum Grown on Grain
18400215d Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 4, Jul-Aug 88 (manuscript received 8 Dec 87; in final form 14 Mar 88) pp 617-619

[Article by G. P. Kononenko, N. A. Soboleva and A. N. Leonov, All-Union Scientific Research Institute of Veterinary Sanitation, Moscow]

[Abstract] Analytical studies were conducted on the identification of enniatins—cyclic hexadepsipeptides—produced by two strains of Fusarium gibbosum grown on rice for 40 days at 29 degrees C. Isolation from the biomass showed that the enniatin yield was on the order of 1.5-2.0 percent. Elementary chemical analysis, in combination with mass spectroscopy, led to the identification of enniatins A_1, B, and B_1. Enniatin A was not detected. References 8: 5 Russian, 3 Western.

UDC 612.273.2:576.31.332

Microfluorescent Analysis of Antihypoxant Effect on Intact Neurons
18400216a Leningrad VESTNIK LENINGRADSKOGO UNIVERSITETA: BIOLOGIYA in Russian Issue 3 (No 17), Aug 88 (manuscript received 16 Oct 87) pp 66-71

[Article by I. N. Yanvareva, I. D. Ilchenko, O. Yu. Uryupov, A. B. Tomchin, M. P. Burgova and V. M. Vinogradov]

[Abstract] Based on the demonstration of a linear correlation between the concentration of antihypoxic agents and the resultant reduction of flavin necleotides in intact neurons, a microfluorescent method was designed to test the effects of a series of antihypoxic agents on the functional status of tissue respiration. The studies were conducted on leech ganglionic Retzius neurons, subject to varying concentrations of guanidine (gutimine), thiadiazole (amtizole), thiazolidine (PS-24), and triazinoindole (No 475, No 407, No 428, and No 411) derivatives. The functional status of the mitochondrial respiratory chain was determined from changes in the redox state of pyridine necleotides as a reflection of corresponding changes in the redox reactions of the flavin nucleotides. Measurements of the changes in fluorescence of the neurons in the green and violet bands of the spectrum (F_{fn} and F_{pn}, respectively) demonstrated that the antihypoxic agents were effective in decreasing the level of reducing equivalents and in triggering processes that increased the energy pool in hypoxic cells. Thus, by reducing the NADH levels the agents favored a higher NAD/NADH ratio, a factor that performs a regulatory role in activating or inhibiting a number of metabolic reactions in the mitochondria and the cytoplasm. Figures 3; references 10: 7 Russian, 3 Western.

UDC 577.352.5:541.9

Induction of Spontaneous Secretion of Neurotransmitters by Structural Isomers of Di-Sec-Butyl-Dibenzo-18-Crown-6
18400216b Tashkent UZBEKSKIY BIOLOGICHESKIY ZHURNAL in Russian No 4, Jul-Aug 88 (manuscript received 12 Jan 87) pp 10-12

[Article by T. R. Akhmedov, U. Z. Mirkhodzhayev, D. Kalikulov, P. B. Usamonov, I. A. Stempnevskaya and A. K. Tashmukhamedova, Tashkent Order of the Red Banner of Labor State University imeni V. I. Lenin]

[Abstract] In view of the demonstration that structural isomers of di-sec-butyl-dibenzo-18-crown-6 induce magnesium-type permeability in bilayer lipid membranes,

trials were conducted with the effects of such isomers on neuromuscular junction of a Rana temporaria preparation. Trials with 4 isomers possessing melting temperatures of 90-93, 84-90, 81-88, and 79-87 degrees C showed that, after a latent period, they induced an increase in the frequency of spontaneous activity. The increase in the frequency of the miniature potentials of the end plate were directly proportional to the concentration of the isomer. In a medium lacking magnesium ions and containing EDTA the magnesium crown ethers were without effect. It appears that the crown ethers in question, like calcium ionophores, increase the permeability of magnesium channels of presynaptic membranes. Figures 2; references 5: 3 Russian, 2 Western.

UDC 597.82:599.325.11:612.815

Comparative Assessment of Synaptic Transmission in Rabbit and Frog Sympathetic Ganglia After Inhibition of Acetylcholinesterase

18400216c Leningrad ZHURNAL EVOLYUTSIONNOY BIOKHIMII I FIZIOLOGII in Russian Vol 24 No 5, Sep-Oct 88 (manuscript received 5 May 88) pp 668-678

[Article by N. Ya. Lukomskaya, V. Yu. Bolshakov and M. V. Samoylova, Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov, USSR Academy of Sciences, Leningrad]

[Abstract] A series of electrophysiological studies were conducted on synaptic transmission in sympathetic ganglia of rabbits and frogs (Rana temporaria) to compare the effects of acetylcholinesterase (EC 3.1.1.7) inhibition by armin. The effects of armin (10^{-6}M) in both preparations was to lead to acculmulation of acetylcholine as a result of enzyme inactivation, with the postsynaptic sequelae differing in the two species. In the case of the upper cervical sympathetic ganglia of the rabbit, both muscarinic and nicotinic cholinergic receptors maintain a stable level of depolarization as a result of acetylcholine accumulation in the synaptic clefts. In the case of the frog preparation, there appears to be no contribution to depolarization by the nicotinic receptors, presumably because of their rapid desensitization. The fall in the membrane potential in the latter situation in the presence of armin is corrected only by muscarinic antagonists. That the differences between the rabbit and frog sympathetic ganglia preparations were not due to differences in the susceptibility of their respective acetylcholinesterases to armin was demonstrated by the fact that both enzymes were inhibited to an equal extent by the inhibitor. Figures 5; references 15: 4 Russian, 11 Western.

UDC 577.15.004.14

Immobilization of Phospholipase A_2 from Central Asian Cobra Venom on Polyamide Sorbents

18400216d Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian Vol 24 No 5, Sep-Oct 88 (manuscript received 4 Jan 88) pp 607-613

[Article by R. A.Akhmedzhanov, Z. T. Salikhova, T. F. Aripov and M. M. Rakhimov, Tashkent State University; Institute of Bioorganic Chemistry, Uzbek SSR Academy of Sciences]

[Abstract] Studies were conducted on the immobilization of phospholipase A_2 (PLA2) derived from the venom of the Central Asian cobra (Naja naja oxiana) on a polyamide sorbent, using both covalent coupling and ligand adsorption. Coupling with glutaraldehyde yield a preparation showing a 9.0 percent activity yield (vis-a-vis soluble enzyme), a specificity of immobilization of 1.00, and a specific activity of 8.6 U/gm sorbent. Systems in which PLA2 was immobilized by adsorption to a ligand—either phosphatidylethanolamine, cytotoxin, or a combination of these two ligands coupled to polyamide granules via gossypol—yielded preparations with specific activates ranging from 17.0 to 40.0 U/gm sorbent, specificities of immobilization of 0.65-3.16, and activity yields of 3.7-20.1 percent. Kinetic studies on immobilized PLA2 showed changes in the pH maxima, heat stability, and susceptibility to Ca++. On balance, noncovalent coupling appears to offer superior results for purposes of affinity chromatography, increasing as it does the recovery of PLA2 from a mixture of proteins 2-to 6-fold, and retaining a specific activity some 2- to 3-fold higher than that obtained with glutaraldehyde. Figures 4; references 19: 14 Russian, 5 Western.

Solubilization and Isolation of Receptors for Dihydropyridine Blockers of Calcium Channels From Rabbit Skeletal Muscles

18400244a Moscow BIOKHIMIYA in Russian Vol 53 No 9, Sep 88 (manuscript received 29 Sep 87) pp 1418-1426

[Article by N. M. Soldatov, Scientific Research Institute of Biomedical Technology, USSR Ministry of Health, Moscow]

[Abstract] The microsomal fraction of rabbit skeletal muscles was used for the solubilization and isolation of dihydropyridine (DHP) receptor, since DHP and its analogs have been shown to be efficient (K_{d} . $_{1}$ nM) blockers of calcium channels. Solubilization was achieved with 0.25 percent digitonin; tritium-labeled riodipine (a DHP congener) was used to monitor yield and activity in the course of isolation. Affinity chromatography employing DHP-Sepharose 4B columns yielded 245-fold purified receptor preparations, showing 60-70 percent purity in terms of specific activity. Polyacrylamide gel electrophoresis in the presence of SDS led to the identification of two polypeptides with molecular weights of 160 and 53 kD. Treatment of the peptides with dithiothreitol or 2-mercaptoethanol had no effect on the electrophoretic mobility of the 53 kD component. However, the concentration of the 160 kD peptide diminished due to disruption of S-S bonds with the appearance of 130 kD component and a minor band with a molecular weight of 102 kD. The data were

compatible with a DHP receptor that functions as a Ca channel and consists, apparently, of two polypeptide subunits. Figures 4; references 21: 2 Russian, 19 Western.

UDC 577.155.07

Use of Monoclonal Antibodies for Isolation of Restriction Endoclease EcoRII

18400244b Moscow BIOKHIMIYA in Russian Vol 53 No 9, Sep 88 (manuscript received 15 Jul 87) pp 1474-1478

[Article by V. G. Kosykh, Yu. A. Mantsygin, N. V. Svyatukhina, I. V. Vitenene and Ya. I. Buryanov, Institutes of Microbial Biochemistry and Physiology and of Biophysics, USSR Academy of Sciences, Pushchino, Moscow Oblast]

[Abstract] An affinity chromatography method was devised for the isolation of EcoRII, based on anti-EcoRII monoclonal antibodies coupled to Sepharose 4B. The monoclonal antibodies were prepared in the conventional manner by immunization of two BALB/c mice with EcoRII, and subsequent fusion of the immune splenocytes with Sp2/0-Ag14 myeloma cells. Subsequently, BALB/c mice were inoculated intraperitoneally with 5-10 x 10^6 of the hybridoma cells with Freund's incomplete adjuvant. The ascitic fluid was collected 7-12 days later and the immunoglobulins were precipitated with ammonium sulfate and isolated on DEAE-cellulose columns. Covalent coupling of the monoclonal antibodies to CNBr-activated Sepharose 4B yield affinity columns that were then used for the recovery of EcoRII from ultrasonic lysates of the superproducer E. coli B834/pSK323. Optimum elution conditions were attained with a descending pH gradient and an ascending NaCl gradient, yielding a preparation giving a single band on SDS polyacrylamide gel electrophoresis and displaying a specific activity of 400,000 U/mg protein. Figures 4; references 19: 4 Russian, 15 Western.

UDC 577.391

Bensitrane- and Quaterin-Activated DNA Synthesis in Rat Hepatocytes Stimulated to Proliferation

18400246a Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR. SERIYA B: GEOLOGICHESKIY, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 10, Oct 88 (manuscript received 22 Apr 88) pp 62-64

[Article by Ya. B. Blyum, N. N. Ostapets, I. Ya. Kalvinsh, G. I. Zelchan, N. Ye. Kucherenko and E. Ya. Lukevits, academician, Latv. SSR Acad. Sci., Institute of Botany, Ukrainian SSR Academy of Sciences, Kiev; Kiev State University; Institute of Organic Synthesis, Latvian SSR Academy of Sciences, Riga]

[Abstract] Bensitrane (p-aminobenzyloxymethylsilatrane) and quaterin (3-(2,2,2)-trimethylhydrazinium propionate have been employed in wound healing, without an exact understanding of their molecular mechanism of action. Accordingly, a study was conducted on the effects of bensitrane and quaterin on DNA synthesis in a model system employing rat hepatocytes after induction of DNA synthesis by cycloheximide (CHI). Uptake of ^{3}H-thymidine by DNA was monitored in hepatocytes derived from outbred male rats treated with CHI (0.2 mg/100 gm; i.p.), with experimental animals treated with either benzitrane (135 mg/kg; i.p.) or quaterin (100 mg/kg; i.p.) 6 h after CHI administration. CHI was determined to increase the rate of DNA synthesis approximately 7-fold, bensitrane increased DNA synthesis 10.2-fold, and quaterin, 25-fold. In the case of bensitrane and quaterin, as was the case previously observed with serotonin, the increase in DNA synthesis was due to an increase in the number of hepatocytes entering the mitotic cycle. Figures 1; references 12: 11 Russian, 1 Western.

UDC 581.19:581.43:531.5

Phospholipid and Fatty Acid Composition of Plasma Membrane of Pea Roots Under Clinostat Conditions

18400246c Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR. SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 10, Oct 88 (manuscript received 28 Apr 88) pp 69-72

[Article by Yu. A. Polulyakh, Institute of Botany, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] The phospholipid and fatty acid composition of the plasma membranes of the roots of 5-6-day-old pea (Pisum sativum L.) shoots were studied after 24 and 48 h of clinostat maintenance. Under control conditions, phosphatidylcholine (PC) and phosphatidylethanolamine (PE) represented 70-80 percent of the total phospholipids. The levels of PC increased during the initial 24 h and fell below baseline values by 48 h, while the converse applied to PE. On balance, the PC + PE combination continued to account for 75-80 percent of the total phospholipids under clinostat conditions. In addition, phosphatidylinositol levels were depressed and phosphatidic acid concentration elevated, suggesting increased metabolic turnover under the effects of hypogravity. Other alterations included an increase in the unsaturated fatty acids, particularly linoleic and linolenic acids, as well as a reduction in saturated fatty acids (largely palmitic and stearic acids). The study demonstrated that, on balance, the plasma membranes remained relatively constant in terms of phospholipids. However, the increase in the preponderance of unsaturated fatty acids reflected a change designed to maintain plasma membrane fluidity. Figures 1; references 12: 10 Russian, 2 Western.

UDC 615.384:612.111.11].07

Biochemical Properties of Intramolecularly Crosslinked Hemoglobin

18400248e Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 106 No 9, Sep 88 (manuscript received 20 Oct 87) pp 302-304

[Article by M. A. Azhigirova, Ye. P. Vyazova, M. G.

Vashkevich, L. V. Fetisova, N. N. Kontuganov and N. I.Afonin, Laboratory of Blood Gas Transport Agents, Central Scientific Research Institute of Hematology and Blood Transfusion, Moscow]

[Abstract] Chemically modified hemoglobin represents one of the more promising agents for artificial gas transport systems, leading to the present assessment of glutaraldehyde-crosslinked hemoglobin derived from rats. Analysis of the products by a variety of conventional techniques demonstrated that the concentration of dimers and tetramers corresponded to 42-45 and 3-15 percent, respectively, of the total hemoglobin, with the free subunits accounting for 31-38 percent of the total. The pI of the crosslinked preparations was ascertained to be in the 7.0-7.1 range, while the pI of the native hemoglobin was in the 6.9-7.2 range. Determinations of oxygen affinity of the crosslinked and native preparations yielded respective p_{50} values of 18.5-20 and 19.5 + over - 1.5 mmHg. In the presence of pyridoxal-5'-phosphate the p_{50} values were, respectively, 27-30 and approx. 40 mmHg. Determination of the half-life values of the crosslinked and native hemoglobin in the test rats yielded values of 4.5 + over - 0.3 and 1.5-2 h, respectively. These observations indicate that the dimer fraction in the crosslinked hemoglobin should be increased to optimize on the half-life parameter of a very promising approach to the construction of an efficient oxygen transport vehicle. Figures 3; references 9: 1 Russian, 8 Western.

UDC 577.352.2:547.639.5.07:542.95:541.49

Membrane Activity and Thermodynamic Parameters of the Complexing of Diacyl Derivatives of Dibenzo-18-Crown-6

18400282 Tashkent UZBEKSKIY BIOLOGICHESKIY ZHURNAL in Russian No 5, Sep-Oct 88 (manuscript received 15 Jan 88) pp 9-10

[Article by G. N. Bakuras, M. V. Tarinova, U. Z. Mirkhodzhayev, and A. K. Tashmukhamedova, Taskent Order of the Red Banner of Labor State University imeni Lenin]

[Abstract] Thermodynamic parameters associated with complexing with a Ca^{2+} ion (ΔG, ΔH, and ΔS) and the relationship of those parameters to membrane activity are studied in a number of diacyl derivatives of dibenzo-18-crown-6. Crown ethers of the derivatives were found to form complexes with a Ca^{2+} ion of the sandwich type, primarily 2:1. The bonding of the CA^{2+} ion and the crown ether takes place as a result of the acyl oxygens of crown-ether radicals. The enthalpy member ΔH made the primary contribution to the energy of the complexing. The dependence of the ΔH enthalpy on length of radical indicates that the complexing energy diminishes with an increase of the length of the radical from diacetyl to dibutyryl. System entropy did not change appreciably in the reactions. The small reduction in ΔS when going from dibutyrl to dinanoyl may be associated with denser packing of the complex. Correlation dependence data indicate that the formation of complexes with the Ca^{2+} ion exert the primary influence on the membrane activity of the derivatives. References 4: 3 Russian, 1 Western.

UDC 577.32

Novel Approach to Modeling Structure and Dynamics of Biomacromolecules and Their Complexes

18400211a Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 304 No 2, Jun 89 (manuscript received 10 May 88) pp 456-460

[Article by A. K. Mazur, R. A. Abagyan and G. B. Yelakov Academician, Pacific Institute of Bioorganic Chemistry, Far Eastern Department, Vladivostok, and the Institute of Molecular Biology imeni V. A. Engelgardt, Moscow, USSR Academy of Sciences]

[Abstract] A novel approach was taken to modeling the structural and dynamic parameters of biomacromolecules by relying on mathematical analysis of the so-called internal coordinates. The latter are understood to encompass dihedral angles of internal rotations, planar angles between valence bonds, and bond lengths. For general applicability to macromolecular systems the concept of a 'conformational tree system' is advanced, relying on a system of Cartesian coordinates to link individual atoms and domains into a putative tree system. Depending on variable internal coordinates the molecule (or 'tree') may be resolved into individual structural bodies in which the smallest unit is represented by an atom. The proposed model allows for an analysis of macro-molecular structures with various degrees of freedom, including analysis of the mobilities of the various components and even of individual atoms. The model thus lends itself to studies on conformational rearrangements of biomolecules that may underlie their bioactivity. Figures 1; references 7: 1 Russian, 6 Western.

UDC 577/352.465

Individual Glutamate-Activated Channels in Cultured Hippocampal Neurons

18400217a Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 5 No 10, Oct 88 (manuscript received 23 Feb 88) pp 1091-1099

[Article by I. N. Sharonova, L. G. Khaspekov and P. D. Brezhestovskiy*, Scientific Research Brain Institute, All-Union Scientific Research Center for Mental Health, and the *Institute of Experimental Cardiology, All-Union Cardiological Research Center, USSR Academy of Medical Sciences, Moscow]

[Abstract] Electrophysiological studies were conducted on glutamate-activated channels in hippocampal cultures derived from 18-19-day-old mouse embryos after 14-30 days of cultivation to assess the behavior of NMDA (N-methyl-D-asparatate)-type glutamate receptors. Using local voltage clamp techniques, 0.1-10 μM glutamate and 1-10 μM NMDA were shown to activate current flow through individual channels. Furthermore, the potential for reversal current was found to be approximately O mV, with an average conductivity of 50 pS. The mean open time of a single channel did not depend on the structural parameters of glutamate agonist and, in a Mg-free solution, was on the order of 12-13 msec. In the presence of Mg ions the channels were blocked in a potential-dependent manner. In some 60 percent of the fragments, 1 μM glycine increased the frequency of long-term (ca.1 sec) channel opening. Naloxone in concentrations of 1 to 10 μM inhibited the effects of glycine and prevented the onset of glycine effects on the channels. In addition, met- and leu-enkephalins in concentrations as high as 1 μM did not reproduce the effects seen with glycine. These observations indicated that in the case under study naloxone did not act via the μ or δ receptors. At the present time it is impossible to identify the portion of the glutamate receptor with which naloxone interacts, although it appears to be the only inhibitor which modulates the effects of glycine on NMDA-activated ion channels. Figures 6; references 27: 2 Russian, 25 Western.

UDC 577.344

Spectral Studies of Photodestruction of Porphyrins

18400217b Minsk DOKLADY AKADEMII NAUK BSSR in Russian Vol 32 No 11, Nov 88 (manuscript received 10 Mar 88) pp 1040-1042

[Article by A. V. Vorobey and T. N. Vadetskaya, Institute of Photobiology, Belorussian SSR Academy of Sciences]

[Abstract] In view of the application of various porphyrin compounds as sensitizers in phototherapy of cancer, a study was conducted on the photostability of two such agents to determine their potential suitability in antineoplastic phototherapy. Meso-tetra (p-sulfophenyl)-prophine (TSPP) and hematoporphyrin (HP) were subjected to the action of helium-neon laser (LG-75, 633 nm, 250 W/m^2) when free in a phosphate buffer, pH 7.4, and when bound to human serum albumin, with the extent of photodestruction monitored by fluorescence spectroscopy. The study was based on the concern that highly susceptible porphyrins may be destroyed before any cellular damage was attained, thus rendering the attempt at therapy ineffective. Assessment of the photodestruction of TSPP, HP, tryptophan, and of albumin tryptophanyl moieties demonstrated that HP was much more susceptible to destruction TSPP. Furthermore, the destruction of HP proceeded at a much faster rate than the photodestruction of the protein. On the basis of these findings, TSPP was shown to be a much more promising agent for use in phototherapeutic trails. Figures 1; references 7: 1 Russian, 6 Western.

UDC 577.352.3:577.344:579.841.51

Formation of an M-Type Intermediate in the Photocycle of Dark-Adapted 13-cis-Bacteriorhodopsin. II. Bacteriorhodopsin-Containing Liposomes and Purple Membranes

18400283 Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 5 No 11, Nov 88 pp 1135-1144

[Article by A. D. Kaulen and V. V. Zorina, Interdepartment Scientific Research Problem Laboratory of Molec-

ular Biology and Bioorganic Chemistry imeni A. N. Belozerskiy, Moscow State University imeni M. V. Lomonosov]

[Abstract] After having shown in earlier research that, in monomer solubilized Triton X-100, single-photon processes render 13-*cis*-bacteriorhodopsin capable of undergoing photochemical conversions with the formation of a deprotonated M-type intermediate, the researchers demonstrate that, with sufficiently high pH, 13-*cis*-bacteriorhodopsin located not in detergent micelles, but in membranes, is capable of forming an M intermediate in the photocycle. This photocycle, as with that of *trans*-bacteriorhodopsin, is accompanied by transmembrane proton transfer. The researchers found this to be true for three preparations—monomer detergent-solubilized bacteriorhodopsin, azolectin liposomes containing primarily monomer bacteriorhodopsin, and purple membranes with the crystal structure of protein molecule. The specific pH value at which 13-*cis*-bacteriorhodopsin became capable of undergoing the conversion depended on the preparation and, with the purple membranes, on the ion density of the incubation medium. Figures 6, references 16: 4 Russian, 12 Western.

UDC 581.1.083:581.143.6

Plant Regeneration from Callus Tissues of Inbred Lines and Hybrid Maize

18400214b Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR. SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian
No 11, Nov 88 (manuscript received 6 Mar 88) pp 80-83

[Article by T. N. Checheneva, V. V. Morgun, corresponding member, UkrSSR Academy of Sciences, and T. A. Ruban, Institute of Plant Physiology and Genetics, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] A summary is presented of studies conducted between 1984 and 1987 on the regeneration of maize plants from 13 inbred lines and 19 maize hybrids, with the explants consisting of immature embryonic tissues of plants cultivated under field conditions and in hothouses. Optimum conditions for callus formation and subsequent plant regeneration called for 1 mg 2,4-dichlorophenoxyacetic acid, 30 gm sucrose, and 1 gm arginine per 1 liter of the nutrient medium. The incidence of callus formation ranged from 10 to 80 percent in the case of the inbred plants and from 19 to 97 percent for the hybrids, with the frequency of plant regeneration per callus ranging from 2 to 20 for the inbred lines and from 4 to 20 for the hybrid plants. Regeneration consisted of both runner morphogenesis and, more often, of somatic embryogenesis. In most cases regeneration was limited to 2 or 3 months of cultivation, but the inbred lines Ps, Chi31, C488 and K13969 retained the ability for plant regeneration after the calluses had been cultured for half a year. In addition, the hybrids Chi31 x C488 and Chi38 x S65 displayed similar propensity for plant regeneration after prolonged culture. Finally, the regenerated plants evidenced considerable phenotypic differences from the plants from which they were derived, which was attributed to the phenomenon of 'somaclonal variation.' Figures 1; references 6 (Western).

Computers in Microbiology

18400218 Riga NAUKA I TEKHNIKA in Russian
No 8, Aug 88 pp 10-12

[Article by A. V. Tyuterev, Institute of Microbiology imeni A. Kirkhenshteyn, Latvian SSR Academy of Sciences]

[Abstract] The Institute of Microbiology has taken the lead in Latvia in introducing computers into basic and applied research and has developed the know-how for modeling biological processes in a manner suitable for translation into productive software. One of the practical applications has found its way into controlling microbial grown, which relies on gas sensors and feedback arrays. Since microbial respiration is a key indicator of physiological status, the method lends itself to creating appropriate conditions in a fermenter or chemostat needed for optimum growth and production of desired metabolites. Introduction of such computerized control systems into the microbiological industry has increased labor productivity by 40 percent in certain processing activities. With the applications of personal computers ever increasing, their use in individual laboratories has also been on the increase. To date, however, Soviet researchers have to rely on PCs imported from abroad. Nevertheless, it is to be expected that in a few years Soviet PCs will also become available.

UDC 579.25.04:579.222:577.152.277

Search for Novel Restriction Endonuclease Producers

18400234f Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian
No 9, Sep 88 (manuscript received 31 Jul 87) pp 86-89

[Article by N. N. Sokolov, N. V. Anikeycheva, A. B. Fisner, O. T. Samko, E. B. Khoroshutina and A. A. Kalugin, Scientific Research Institute of Medical Enzymology, USSR Academy of Medical Sciences, Moscow]

[Abstract] The rapid toluene method [Sokolov, NN, et al., BYUL. EKSPER. BIOL., No 2:163, 1984] was used in screening 154 strains of bacteria, representing 32 genera and 104 species, for restriction endonucleases on phage λ DNA. Ten of the strains examined displayed restriction activity in the presence of Mg^{2+}, with the highest activities and stability shown by two Pseudomonas aeruginosa enzymes designated PaeI and PaeII. Analysis of their substrate specificity on λ and pBR322 DNAs indicated that they were isoschizomers of SphI and SmaI enzymes, respectively. Other genera identified as producing restriction endonucleases were Bacillus (5 strains), Arthrobacter (2 strains), and Vibrio (1 strain). References 15: 5 Russian, 10 Western.

UDC 616.127-005.4-044.1-036.22(470.311)

Prevalence of Ischemic Heart Disease in Relation to Major Risk Factors in Males 20-59 Years Old in Moscow

18400219 Moscow KARDIOLOGIYA in Russian
Vol 28 No 10, Oct 88 (manuscript received 9 Apr 87) pp 80-84

[Article by V. V. Konstantinov, G. S. Zhukovskiy, N. V. Perova, O. S. Konstantinova, A. V. Kapustina and G. I. Burlutskiy, Scientific Research Institute of Preventive Cardiology, All-Union Cardiological Scientific Center, USSR Academy of Medical Sciences, Moscow]

[Abstract] An epidemiological study was conducted on the prevalence of ischemic heart disease (IHD) among males in Moscow 20-59 years old, as well as an assessment of the major health risk factors. The study encompassed 3308 males divided into 10-year age-span categories. The overall incidence of IHD was 9.7 percent, ranging from 2.8 percent for the 20-29 age group, to 5.3

percent for the 30-39 group, 10.0 percent for the 40-49 group, and 24.6 percent for the 50-59 age bracket. Evaluation of the various risk factors in relation to actual presence of IHD demonstrated in unequivocal terms that the incidence of IHD was 1.5 to 2-fold higher for overweight individuals, as well as for those with elevated levels of cholesterol (260 mg/dL or more) and triglycerides (200 mg/dL or more), hypo-alpha-cholesterinemia (34 mg/dL or less), and frank or borderline hypertension (140-150 mmHg systolic or 90-94 mmHg diastolic). These observations provided additional confirmation for the need to control the health risk factors that predispose to IHD. References 27: 15 Russian, 12 Western.

UDC 616.98:579.842.15]-036.22

Etiologic Structure of Bacterial Dysentery in USSR in 1983-1985

18400234c Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 9, Sep 88 (manuscript received 13 Aug 87) pp 59-63

[Article by Yu. P. Solodovnikov, All-Union Shigelloses Center, Central Scientific Research Institute of Epidemiology, USSR Ministry of Health, Moscow]

[Abstract] Monitoring studies were conducted on the bacterial spectrum related to dysentery in the USSR for the period 1983-1985. Based on the results provided by 24 monitoring stations, the data indicated that Shigella sonnei predominated as the etiologic agent in areas with good water supply, whereas Sh. flexneri was the predominant isolate in regions with poor water supply arrangements. In addition, Sh. dysenteriae and Sh. boydii were found to be of minor importance as etiologic agents of dysentery in the USSR in the period of interest. However, in conjunction with global trends, the isolation of Sh. dysenteriae I in the USSR has been on the increase. Biological analysis of the Sh. sonnei isolates has shown that serotypes IIe, IIg, and Ia are widespread in the USSR. The most common isolates of Sh. flexneri were represented by 2a, 6, and 1b. References 7 (Russian).

UDC 616.931:614.47

Diphtheria Morbidity in Light of Preventive Inoculation

18400253 Minsk ZDRAVOOKHRANENIYE BELORUSSII in Russian No 10, Oct 88 (manuscript received 28 Jan) pp 14-16

[Article by L. I. Bardina, cand. med. sci., L. V. Yeliseyeva and A. G. Moroz, cand. med. sci., Belorussian Scientific Research Institute of Epidemiology and Microbiology]

[Abstract] A survey was conducted on the patterns of diphtheria morbidity in Belorussian over a 40-year period (1946-1986), and on the 8-year pattern (1979-1986) of the prevalence of the pathogenic agent in the population, in order to predict diphtheria morbidity in Belorussia for the period up to 1991. The data showed that preventive inoculation on a mass scale was effective in controlling the outbreaks of diphtheria, reducing the incidence from a high of 144.2 cases per 100,000 population in 1956, to a low of 0.108 cases per 100,000 in the 1981-1985 phase. In view of the absence of an active preventive campaign, computer regression analysis suggests that the incidence will rise to 0.117 per 100,000 in 1987-1990, with the predicted trend showing a figure of 0.13 per 100,000 in 1991. Furthermore, the data also revealed that 85 percent of the patients in 1984-1985 were adults. Analysis of the current patterns and risk groups, as well as the carrier patterns, showed that immunization against diphtheria should be reintroduced on a compulsory basis in conjunction with close monitoring of the carrier rate. Particular attention needs be paid to the immunization of the adult population, with emphasis on those in the 35-39 age bracket. Figures 2; references 2 (Russian).

UDC 577.2

Cloning and Expression of Pseudomonas Putida pBS286 Gene for Catechol-2,3-Oxygenase in Escherichia Coli

18400249a Moscow GENETIKA in Russian
Vol 24 No 9, Sep 88 (manuscript received 14 Dec 87) pp 1550-1561

[Article by T. V. Tsoy, I. A. Kosheleva, V. S. Zamarayev, O. V. Trelina, S. A. Selifonov, M. Yu. Zakharova, I. I. Starovoytov and A. M. Boronin, Institute of Microbial Biochemistry and Physiology, USSR Academy of Sciences, Pushchino, Moscow Oblast]

[Abstract] Conventional genetic engineering studies were conducted on the cloning and expression of catechol-2,3-oxygenase, encoded by Pseudomonas putida-borne plasmid pBS286, in Escherichia coli. The initial steps involved construction of recombinant plasmid pBS955 containing pBS286 inserts (approximately 3.8 kb out of a total of 6.5 kb in pBS955). Transformation of E. coli with the recombinant plasmid imparted catechol-2,3-oxygenase activity to the transformed cells, albeit at a much lower level than seen with pBS286. The plasmid pBS955 was detectable in the E. coli cells for at least 20 generations. Further studies revealed that the expression of the enzyme in question in the case of pBS955 was under the control of the lac-promoter of vector pUC19. E. coli minicells bearing pBS955 synthesized a 32 kD peptide and a 34.5 kD peptide. Studies with deletion mutants of pBS955 showed that the 32 kD peptide determines catechol-2,3-oxygenase activity and the direction and order of transcription of the two peptides as 32 kD - 34.5 kD. Based on the results of hybridization studies and the previously determined order of genes in the nah-1 operon of pBS286, it appears that the 32 kD peptide, which controls the activity of the enzyme, is a product of gene nahC. The 34.5 kD peptide appears to be a product of the nahD gene. Figures 6; references 25: 7 Russian, 18 Western.

UDC 579.252.23:842.23

Novel Pathogenicity Trait of Yersinia Pseudotuberculosis Encoded in Plasmid pVM82

18400249b Moscow GENETIKA in Russian
Vol 24 No 9, Sep 88 (manuscript received 2 Mar 88) pp 1562-1571

[Article by A. L. Gintsburg, F. N. Shubin, G. A. Shovadayeva, A. N. Kulichenko, N. V. Yanishevskiy and G. B. Smirnov, Scientific Research Institutes of Epidemiology imeni N. F. Gamaleya, Moscow, and of Epidemiology and Microbiology, Siberian Department, Vladivostok, USSR Academy of Medical Sciences; All-Union Scientific Antiplague 'Mikrob' Institute, Saratov]

[Abstract] Yersinia pseudotuberculosis isolated from patients during epidemic outbreaks of the disease were shown to possess at least two plasmids identified as pVM45 (45 MD mol. wt.) and pVM82 (82 MD mol. wt.), while isolates from sporadic cases never possessed pVM82. The pVM82 plasmid was borne by Y. pseudotuberculosis isolates obtained from various regions of the USSR and confirmed to be indentical in all studies. Hybridization studies demonstrated that pVM82 was unrelated to the FraI plasmid, but that its genome consisted of a 57 MD plasmid DNA component and a 25 MD DNA component derived from Y. pseudotuberculosis genome. Western blot hybridization was utilized to show that pVM82 evidently suppressed or modified Y. pseudotuberculosis antigens, since rabbits immunized with bacteria grown at $< 20°C$ failed to form an antibody response against some antigens, but did so when immunized with cultures grown at 37°C. This observation may be related to the previously reported fact that cultivation of Y. pseudotuberculosis at low temperatures enhances its virulence. Figures 5; references 19: 10 Russian, 9 Western.

UDC 575.1:633.11

Horizontal Resistance of Wheat to Brown Rust Linked to Ineffective Vertical Resistance. Part II. Specificity of Host-Parasite Relationship

18400249c Moscow GENETIKA in Russian
Vol 24 No 9, Sep 88 (manuscript received 18 Sep 86; in final form 5 Jan 87) pp 1624-1631

[Article by I. G. Odintsova and L. A. Mikhaylova, All-Union Scientific Research Institutes of Plant Industry imeni N. I. Vavilov and of Plant Protection, Leningrad]

[Abstract] Experiments were conducted to test the hypothesis that horizontal resistance to phytopathogens is under the control of major resistance genes that have lost their effectiveness as a result of the appearance of pathogens that have developed means of overcoming the protective mechanism under the control of such plant genes. In fact, such plant genes may have a negative effect in terms of plant resistance to phytopathogens. The basic experimental approach consisted of studying the specificity of host-pathogen relationship in Thatcher (Tc) wheat-brown rust fungus system to assess the pathogens efficiency in abrogating this form of residual resistance. The degree of residual resistance was assessed vis-a-vis resistance genes Lr10, Lr11, Lr12, and Lr14b on the basis of the number of pustules per unit of leaf surface and the number of spores per pustule. Complete diallelic experiments and abbreviated schemes (auto and allocombinations) yielded similar results with a high correlation coefficient ($r = +0.92$). In the case of TcLrlp and TcLrll, the fungal pathogen was found to be more compatible with the host with which it was commonly associated than with an alien host. On the basis of these considerations an evolutionary scheme was devised for host-parasite compatibility. In short, the pathogen evolves to overcome resistance genes, with the latter in some cases then assuming the role of a compatibility gene. Such situations, however, can only prevail in the

case of cultured plants since, in nature, such plants would be eliminated from the surviving pool. Figures 1; references 19: 2 Russian, 17 Western.

UDC 578.5

Cloning and Study of the Structural Organization of the inh(lip)-hoc Gene Region of T4 Bacteriophage

18400277a Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 303 No 6, Dec 88 (manuscript received 15 Sep 88) pp 1486-1489

[Article by A. V. Kaliman, M. A. Khasanova, V. M. Kryukov, V. I. Tanyashin, Academician A. A. Bayev, Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Pushchino, Moscow Oblast]

[Abstract] The inh(lip) gene codes the synthesis of a proteinase inhibitor, a product of gene 21. In its natural form and when modified with genetic engineering, the inhibitor is of interest from the standpoint of the mechanism of protein processing and its possible use in biotechnology. The hoc gene is promising for the development of highly antigenic protein constructions. The researchers studied the structural organization of the inh(lip)-hoc gene region in order to determine the nature of transcription and the regulator elements that determine gene functioning. The primary structure of the inh-hoc gene region was determined with a length of 2,993 nucleotide pairs. Analysis of the structure showed that there are open reading frames on various DNA chains. On the DNA l-chain are three polypeptide-coding open reading frames with lengths of 97, 205, and 139 amino acids, with the frame of 139 amino acids a part of an open reading frame that goes beyond the sequenced region. The open frame with 97 amino acids does not have a classical sequence, the complementary 3'-end sequence of ribosomal 16S RNA. There are two open reading frames—226 and 376 amino acids—in the r-chain of the sequenced area. The protein that is coded by the latter frame corresponds to the hoc gene product in terms of threonine residues, amino acid content, and molecular weight. Between the reading frames of 205 and 226 amino acids are two potential promoters transcription from which is in opposite directions. The promoters are located on different DNA chains in a fragment near 50 nucleotide pairs. The structure of the promoters has all the typical features of late T4 phage promoters, plus an exceptionally conservative site—10 TATAAATAT. A strong potential transcription terminator is located after the hoc gene, which derives its name from the properties of its highly antigenic product (highly antigenic outer capsid protein). The use of the hoc gene may be promising for the creation of highly immunogenic polyantigenic construction of proteins with epitopes whose antigen activity are usually insufficient. The creation of superproducers of the protein is possible, as is the use of hybrid proteins as antigens. Figures 3, references 15: 3 Russian, 12 Western.

UDC 615.37:579.842.23].03.07

Prospects in Use of Monoclonal Antibodies Against Yersinia Pestis

18400220 Moscow ANTIBIOTIKI I KHIMIOTERAPIYA in Russian Vol 33 No 9, Sep 88 (manuscript received 13 Jun 87) pp 687-690

[Article by G. A. Temiraliyeva, I. S. Arakelyan, L. Yu. Lukhnova, R. A. Apsatarova, N. P. Kravchenko and O. Ya. Aymanova, Central Asian Scientific Research Antiplague Institute, Alma Ata]

[Abstract] A brief survey is presented of the potential use of a monoclonal antibody preparation against Yersinia pestis derived from a strain of hybridoma cells designated F_9. The F_9 cells were prepared by fusion of Sp210-Ag14 myeloma cells with splenic B lymphocytes of BALB/c mice immunized with the capsular antigen of Y. pestis, F1. highest purity IgG antibodies was obtained by precipitation with caprylic acid. They were shown to be suitable for the preparation of highly sensitive reagents for passive hemagglutination reactions and for enzyme immunoassay. The F_9 cells were shown to retain their viability and antibody production after 2 years of cryopreservation at the temperature of liquid nitrogen. Lyophilization of the monoclonal antibodies with 1:10,000 merthiolate reduced specific antibody activity two-fold. However, the lyophilized antibody retained its activity after storage at room temperature, 4 degrees C, or 37 degrees C for 30 days, and after heating at 56 degrees C for 3 h. References 12: 6 Russian, 6 Western.

UDC 615.371:579.842.15].015.46:612.124.017.1:547.962.4].076.9

Stimulation of Secretory IgA System in Monkeys Immunized Parenterally With Shigella Sonnei Ribosomal Dysentery Vaccine

18400234e Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 9, Sep 88 (manuscript received 17 Jun 87) pp 66-70

[Article by E. K. Dzhikidze, Z. K. Stasilevich and S. A. Salamatova, Institute of Experimental Pathology and Therapy, USSR Academy of Medical Sciences, Sukhumi; Moscow Scientific Research Institute of Epidemiology and Microbiology imeni G. N. Gabrichevskiy, RSFSR Ministry of Health]

[Abstract] A study was conducted on the pattern of antibody response to parenteral immunization of rhesus monkeys with 600 μg of Sh. sonnei ribosomal vaccine, with particular attention to the secretory IgA component. Subcutaneous administration of the vaccine once or twice provided a considerable degree of clinical protection and favored earlier clearing of the pathogen from the body. Solid-phase immunoassays showed increases in serum levels of IgM, IgG, and IgA, as well as in saliva IgA, against the O antigen. The antibody dynamics were quite similar, peaking 1-2 weeks after immunization and falling after 3 weeks. The highest rate of increase was observed in the case of IgM (about 16-fold), followed by 4- and 8-fold for IgA, and then by IgG (2- and 4-fold). Like the serum levels of IgA, levels of this antibody class in the saliva also showed a profound increase of 8- to 16-fold. However, differences in the actual levels of serum and saliva IgA, which ranged from 0.5 to 300, argue against a transport mechanism from the serum to the saliva and for a local synthesis of salivary IgA. Oral infection of unimmunized monkeys resulted in a much larger serum IgA response (about 1000-fold) over control levels than the response to IgG and IgM. Salivary IgA levels remained equivalent to those obtained with the vaccine. The mechanisms for the high serum and relatively low salivary IgA responsiveness remains unclear, but underscores the contention that there is no meaningful transport of serum IgA to the saliva. Figures 2; references 8: 6 Russian, 2 Western.

UDC 579.842.23:579.24]:579.61:616.155.33-008.97:579.842.23

Changes in Latent Virulence of Vaccine Strain of Yersinia Pestis During Growth in Macrophages

18400234d Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 9, Sep 88 (manuscript received 23 Mar 87) pp 63-66

[Article by G. I. Vosilyeva, Ye. P. Doroshenko and A. K. Kiseleva, Rostov-on-Don Scientific Research Antiplaque Institute]

[Abstract] A comparative analysis was conducted on changes in the latent virulence of a vaccine strain of Yersinia pestis EV on in vivo and in vitro passage in macrophages. In the latter case, the bacterial cells were passed 20 times through cultured peritoneal macrophages derived from guinea pigs and white mice; and in the former case, 20 times via subcutaneous injection into guinea pigs and white mice, isolation from lymph nodes and internal organs, and reinjection. The final isolates were then tested on white mice for LD_{50} values following intraperitoneal administration. The results showed that whereas the LD_{50} for the original control, vaccine cells was 530 bacterial cells, the corresponding LD_{50} values for Y. pestis EV passed through tissue cultures of guinea pig and mouse macrophages were 20 and 64 bacterial cells, respectively. The LD_{50} values for Y. pestis EV passed 20 times through guinea pigs and white mice were, respectively, 20 and 74 cells. The data demonstrated that in both cases virulence was enhanced, with passage in guinea pigs or their peritoneal macrophages leading to much greater recovery of virulence in a vaccine strain of Y. pestis. Evidently, guinea pig peritoneal macrophages appear to favor microbial synthesis of

some virulence factor in a more efficient manner than the stimulus received from murine macrophages. References 11: 10 Russian, 1 Western.

UDC 619:576.851.136:576.807.7

Extracting Membranes and Ribosomes from Cells of a Virulent Strain of Listeria

18400312 Moscow VETERINARIYA in Russian
No 12, Dec 88 pp 35-38

[Article by I. A. Bakulov, A. A. Tsyganova, D. A. Vasilyev, V. Ye. Belousov, V. M. Kotlyarov, N. B. Bakaldina, and G. F. Arkhipova, All Union Scientific Research Institute of Veterinary Virology and Microbiology]

[Abstract] The use of special techniques for extracting certain bacterial-cell fractions makes it possible to select the protective components of microorganisms in the creation of means for specific prevention of infectious diseases. Since Youmans and Youmans established the presence of protective properties in bacterial ribosomes in 1965, the effectiveness of ribosomal vaccines has been demonstrated for many microorganisms. The nature of their immunogenicity, however, is not quite clear, some researchers asserting that RNA is the effective immunogen, others asserting that only ribosomal proteins are immunogenic, and still others asserting that both RNA and the protein are responsible for the protective effect. Opinion also varies on the mechanism of action of ribosomal RNA. Interest in the creation of ribosomal vaccines is quite high notwithstanding, because not only do they demonstrate protective activity and create long-term immunity, but they also can induce protection against strains of other serotypes within a species. The work reported here involves research to elucidate the potential for creating a listeriosis vaccine based on the use of ribosomes and membrane fractions. Two techniques were used to obtain the ribosomes and the membranes—the first involving the extraction of the ribosomes from the protoplasts of listeria cells, the second involving the disintegration of the bacteria. The preparations that were produced were then studied in outbred white mice weighing 18-20 g and chinchilla rabbits weighing 2.5-3 kg. The animals were immunized either once or twice (with a 7-day interval) and then, after 14 days, infected with doses of 4 LD_{50} and 10 LD_{50}. In the first series of experiments, the mice were placed into 15 groups and immunized once, subcutaneously, with various preparations based on the ribosomes. The pure ribosome preparation and the preparation combining ribosomes and membranes produced a protective effect. Varying the size of dose had no effect. Mice receiving two immunizations (protein contents of 0.5 mg and 0.75 mg) were best protected by preparations consisting of membranes only or the combination of membranes and ribosomes (greater than 80% survival rate). The technique used for producing the preparations had no bearing on the outcome. The rabbits were immunized twice, with either a ribosome preparation or preparations containing ribosome combinations. The combinations proved to be more effective than the ribosome alone. Figures 1, references 6 (Western).

UDC 577.391.591.818.621.375.8

Lethal and Mutagenic Effects of Picosecond 532 nm Laser Pulses

18400183b Moscow RADIOBIOLOGIYA in Russian Vol 28 No 4, Jul-Aug 88 (manuscript received 19 Oct 87) pp 499-502

[Article by T. Y. Karu, L. V. Pyatibrat, O. A. Tiflova and D. N. Nikogosyan, Scientific Research Center of Industrial Lasers and the Institute of Spectroscopy, USSR Academy of Sciences, Troitsk, Moscow Oblast]

[Abstract] A study was conducted to assess the specifics of lethal and mutagenic effects of picosecond Nd:YAG laser pulses on prokaryotic (E. coli) and eukaryotic (HeLa) cells. The HeLa cells in active and stationary phases of growth and E. coli WP2 trp $^-$ were subjected to single ultrashort pulses of an Nd:YAG laser (532 nm; peak intensities from 4 x 10^{12} to 10^{14} W/m^2; duration, 3.3 x 10^{-11} sec). The results showed that both the HeLa and E. coli cells were highly resistant to the adverse effects of the Nd:YAG laser irradiation. The fraction of surviving cells fell to 0.75 for the HeLa cells after 500 pulses. The fraction of surviving E. coli cells after 1500 pulses was 0.73 +/- 0.07. Furthermore, in the latter case there was no evidence of mutagenicity in terms of conversion to trp $^+$ genotype. On balance, the date demonstrate the innocuous nature of irradiation of HeLa and E.coli cells with Nd: YAG laser under the conditions specified. Evidently, the intensities employed here were insufficient for multi-quantum photochemical reactions in the chromophoric centers of the pro-and eukaryotic cells. Figures 2; references 13: 5 Russian, 8 Western.

Laser Emission Parameters as Determinants of Coagulation Specifity in Layered Biological Tissues

18400213 Kishinev ELEKTRONNAYA OBRABOTKA MATERIALOV in Russian No 4, Jul-Aug 88 (manuscript received 19 Dec 86) pp 62-66

[Article by V. K. Pustovalov and I. A. Khorunzhiy, Minsk]

[Abstract] A biophysical analysis was conducted on the parameters characterizing laser irradiation in relation to coagulation effects induced by laser action in biological tissues. The mathematical models that have been developed were designed to account for the coagulation effects in terms of dimensions of the induced lesion, its shape, and localization in the different tissues. Such considerations find special and necessary applications in ophthalmologic laser coagulation, where special care has to be accorded to individual susceptibility of tissues in close proximity to one another, as well as the optical characteristics of the various ocular components. Most of the work to date has been done with the argon laser emitting at 0.514 μm. However, more recently, clinical practice has also encompassed other laser modalities that required further expansion of the model systems used to characterize laser coagulation. Additional data for laser-tissue interaction have now been derived for the coefficients of absorption by the different eye tissues for lasers with wavelengths at the 0.,530, 0.647, and the 1.060 μm bands. The 1.060 μm laser, for example, has the lowest absorption coefficient and shows the greatest penetration through layers of various tissues. As a result the coagulation achieved with the neodymium laser emitting at this wavelength has a prolonged, extended shape. Consideration of such factors may lead to improved therapeutic results in the management of such conditions as diabetic retinopathy, neoplasms, and intraocular hemorrhages. Figures 9; references 10: 6 Russian, 4 Western.

UDC 577.352.333

Laser Action on Phosphoinositide Cycle and Calcium Uptake in Squid Nerve Trunk

18400221 Moscow BIOLOGICHESKIYE NAUKI in Russian No 9, Sep 88 (manuscript received 12 Jun 87) pp 26-28

[Article by V. A. Trofimov and V. V. Revin, Mordovian State University]

[Abstract] The demonstration that laser action may alter the electro-physiological characteristics of nerves led to a metabolic study to elucidate the possible mechanism of action underlying this phenomenon. Consequently, a comparative study was conducted on the effects of helium-neon laser action and electrical stimulation, as well as on the effects of the combination of these two factors, on phosphoinositide metabolism and calcium uptake in the squid axon. Laser action (LG-75, 632.8 nm, 2 mW, 5 min) resulted in an increase in the levels of the tri- and di-phosphoinositides by 69 and 106 percent, respectively. The concentration of phosphatidic acid increased by 13.3 percent, while that of monophosphoinositides decreased by 41.4 percent. Electrical stimulation of the axons (square pulses, 750 mW, 5 min) led to increases of the levels of the tri- and di-phosphoinositides by 100.7 and 26.3 percent, respectively. The levels of monophosphoinositides and phosphatidic acid fell by 22.9 and 39.3 percent, respectively. Joint application of laser action and electrical stimulation led to elevation of tri- (by 16 percent) and di-phosphoinositides (by 45.2 percent), and to depression of monophosphoinositides (by 8 percent) and phosphatidic acid (by 26.6 percent). Laser action alone led to depression of calcium uptake by 73 percent, while electrical stimulation enhanced calcium ingress. Combination of the two factors inhibited calcium accumulation by 62 percent. Helium-neon action on the squid axon was thus shown to enhance

phosphoinositide synthesis and inhibit its metabolic breakdown, and to diminish calcium uptake due to its desorption from the cell membrane. Figures 1; references 9: 2 Russian, 7 Western.

UDC 617.735-002-02:616.633.66-085.849.19

Argon Lason Coagulation in Diabetic Macular Retinopathy

18400240a Odessa OFTALMOLOGICHESKIY ZHURNAL in Russian No 4, 1988 (manuscript received 3 Nov 86) pp 207-209

[Article by A. D. Semenov and F. A. Romashenkov, senior scientific fellows, O. A. Plyukhova, junior scientific fellow, and O. P. Pankova, candidate of medical sciences, Moscow Scientific Research Institute of Eye Microsurgery]

[Abstract] A comparative analysis was conducted on the outcomes of diabetic retinopathy management either by laser photocoagulation in conjunction with conventional drug regimens, or with chemotherapy alone. The former category encompassed 131 patients (207 eyes) ranging in age from 18 to 52 years; the latter cohort consisted of 42 patients (63 eyes). Laser photocoagulation was performed either with argon laser M-900 or krypton laser M-920 with a power output of 100-350 mW, using 0.1-0.2 sec exposures and burn spots of 50-200 μm. The followup period covered 2 to 5 years. Depending on the clinical condition and the mode of photocoagulation employed, coagulation in the area of the macula lutea, generally combined with peripheral or panretinal coagulation, led to abatement or complete elimination of exudative changes in 59.9 percent of the laser group. In the control group treated only with drugs, improvements were seen in 28.5 percent of the cases. These findings provide strong indication for more extensive use of laser photocoagulation in the treatment of diabetic retinopathies. Figures 2; references 8: 4 Russian, 4 Western.

UDC 617.736-002-02:616.633.66-085.849.19

Diabetic Macular Retinopathy: Advisability and Tactics of Preventive Laser Interventions. Long-Term Observations

18400240b Odessa OFTALMOLOGICHESKIY ZHURNAL in Russian No 4, 1988 (manuscript received 16 Dec 87) pp 210-213

[Article by Yu. A. Ivanishko, cand. med. sci., A. A. Bochkareva, professor, and N. E. Temirov, doctor of med. sci., North Caucasian Ophthalmological Laser Center; Chair of Eye Diseases, No 1 Rostov Medical Institute]

[Abstract] Trials were conducted with argon laser photocoagulation as a preventive modality in the case of diabetic macular retinopathy. A group of 34 patients at risk of diabetic retinopathy, without any indication of retinal edema or microcystic changes in the fovea and with a visual acuity in the range of 0.6 to 1.0, were subjected to preventive panretinal laser photocoagulation alone, or in combination with either horseshoe coagulation around the fovea, or with panmacular coagulation. Followup observations spanned 6-9.5 years. The respective incidences of macular edema in these three groups were approximately 37, 10, and 11 percent; incidences of microcystic changes were 12, 5, and 5 percent. A control group of 13 patients could be followed for only 3.2 years after conventional drug management in view of the onset of frank diabetic retinopathy, which called for the employment of laser photocoagulation. Laser treatment, in addition to its proven efficacy as a preventive modality, was observed to be free of any serious complications and did not lead to cataracts. References 20: 7 Russian, 13 Western.

UDC 617.7-085.849.19:621.375.826

Multiple-Use Polarization Filter for Milliwatt Lasers

18400240d Odessa OFTALMOLOGICHESKIY ZHURNAL in Russian No 4, 1988 (manuscript received 6 Mar 87) pp 252-253

[Article by Yu. A. Tyurikov, docent, and N. I. Dyachenko, physician, Chair of Eye Diseases, Karaganda Medical Institute]

[Abstract] Advantage was taken of the following relationship between the power of a laser beam before and after passing through a polarizing filter for modulating the power flux of milliwatt lasers: $y = x \cdot \cos^2 \alpha$, where y is the power after passing through the filter, with a horizontal place of polarization, x is the power before polarization, and α is the angle of the plane of polarization relative to the horizontal. This relationship may easily be applied to actual situations by setting a graduated scale on the rotating ring of the polarizing filter to express power output in relation to the angle to derive the value of y, knowing x. An attachment of this type may find use in expanding the use of milliwatt ophthalmological lasers. Figures 3.

UDC 615.849.19.015.4:616.16-031:611.819.1]-008.1

Helium-Neon Laser Action on Circulation in Pa Mater Blood

18400248g Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 106 No 9, Sep 88 (manuscript received 19 Dec 86) pp 309-311

[Article by V. I. Kozlov, F. B. Litvin, V. S. Sinyakov and S. A. Vdovichenko, Scientific Research Institute of Laser Surgery, USSR Ministry of Health; Scientific Research Institutes of Physiology of Children and Adolescents and of General Pathology and Pathologic Physiology, USSR Academy of Medical Sciences, Moscow]

[Abstract] Microscopic studies were conducted to assess age factors in the susceptibility of pia mater vasculature to helium-neon laser action (0.63 nm wavelength; 40 mW power output; 1-30 min exposures of 10-20 mm

target spots). The studies, performed with 7- to 90-day-old white rats, demonstrated that with increasing age the susceptibility of the blood vessels to the helium-neon laser diminished. In general, however, the basic effects consisted of local vasodilation and constriction at distal sites. The degree of vasodilation was directly correlated with the duration of exposure and inversely to the diameter of the vessel. Concomitantly, laser irradiation enhanced blood flow in the arterioles and venules and promoted a regional increase in hematocrit. Figures 3; references 8: 6 Russian, 2 Western.

Clinical and Biochemical Parallels in Traditional Treatment and Laser Therapy for Ischemic Heart Disease Patients

18400323 Moscow TERAPEVTICHESKIY ARKHIV in Russian Vol 60 No 12, Dec 88 (manuscript received 7 Jul 87) pp 40-44

[Article by I. M. Korochkin, A. V. Kartelishev, S. Yu. Leshakov, G. M. Kapustina, N. s. Vernekina, G. V. Babushkina, and N. A. Lebedeva, Department of Internal Medicine No 4, Second Moscow Medical Institute imeni N. I. Pirogov, All Union Scientific Research Institute of General and Forensic Psychiatry imeni V. P. Serbskiy, USSR Ministry of Health, Moscow]

[Abstract] The mechanisms of the positive therapeutic effect of helium-neon laser irradiation in ischemic heart disease (IHD) remain unclear for the moment. An analysis of clinical and biochemical indices here searches for pathochemical criteria measuring the effectiveness of the technique, which works at the cell-membrane level. The researchers compared the clinical effect of the laser therapy with that of traditional treatment and examined the dynamics of the basic indices of lipid metabolism in blood serum and erythrocyte membranes, the kinetics of lipid peroxidation, and variations in the blood serum content of the endogenous antioxidant, α-tocopherol. A total of 221 IHD patients were divided into two groups: the first receiving laser therapy, and the second, traditional treatment (nitrates, [g–]blockers, and calcium antagonists). A good outcome (elimination of stenocardia and, consequently, the cessation of medication with nitroglycerin) was produced in 77% of those of the first group and in only 44% of those of the second group. A satisfactory outcome (rarer and weaker anginal episodes, with a 50% or greater reduction in nitroglycerin medication) was achieved in 21% and 46%, respectively. An unsatisfactory outcome (no clinical effect) was observed in 2% and 10%. Laser-treated patients remained in remission longer than did those treated traditionally (7-12 months or more versus 6 months or less) and demonstrated clinical effects roughly two weeks sooner than did their counterparts. Laser therapy produced positive changes in blood lipoprotein levels that were more pronounced than those effected by the traditional treatment (α-lipoproteins increased, and pre-β- and β-lipoproteins decreased). Changes in the lipid and phospholipid composition of erythrocyte membranes were similarly more pronounced with laser therapy, which also led to mobilization of antioxidant protection of cell membranes. The administration, however, of membrane-protective drugs and drugs enhancing cell energy and antioxidant defense may prevent the temporary exacerbation of IHD that was generally noted at one point in the laser therapy. The researchers suggest that the effectiveness of the laser therapy may be associated with restoration of the structure and functions of certain cell receptors. References 11 (Russian).

Chalones Inhibit Tumor Growth

18400197 Yerevan KOMMUNIST in Russian 24 Dec 88 p 2

[Article by E. Mkrtchyan, ARMENPRESS correspondent: "Chalones Against Cancer: The Encouraging Experience of Armenian Scientists"; first paragraph is source introduction to article]

[Text] **High coagulability of blood is one of the factors that aids the growth of malignant neoplasms. Scientists of the Oncological Scientific Center of the republic's ministry of health have reached that conclusion.**

"The fight against cancer today is mainly directed at early diagnosis of tumors," says Professor L. Mkrtchyan, director of the center. "With modern microscope techniques, we have identified on the surface of cancer cells threads of fibrin—coagulated blood protein—which participates in the most common pathological processes. And we were faced with the question, What is the biological expedience of the fibrin coverings of cancer cells? It turned out that fibrin camouflages the specific nature of the surface of the cancer cells, mimicking a commonplace situation and making them less vulnerable to immune factors. In essence, this is a response of self-preservation on the part of the tumor cells. In view of that, the need to determine the degree of coagulability of the blood in individuals who are in a group of elevated oncological risk becomes understandable. Our research shows that individuals with a high capacity for forming fibrin in the blood are ten times more susceptible to tumor pathology than are other individuals.

"We know that the human body develops substances that are capable of suppressing the process of cell division. Chalones are one such substance. In the laboratories of the Oncological Center, we demonstrated experimental models on which, with chalones, we were able to slow the growth of cancer of the liver considerably. The oncologists of the scientific center extract chalone from normal bone tissue and use it to suppress the growth of osteosarcoma caused by radioactive strontium."

A good preventive and therapeutic effect in the experiment was obtained with the combined use of fibrinolytic enzymes and chalones, which simultaneously decamouflaged the cancer cells and selectively suppressed their division. The scientists feel that this area of research holds promise for the development of means of affecting tumor growth. The complexity inherent in fighting cancers is due to the fact that there are a great many malignant neoplasms—as many as 140 forms, with various mechanisms of development and growth, which means that there can be no talk of creating a universal anticancer drug.

Blood Test for Early Cancer Detection

18400267 Moscow SOVETSKAYA ROSSIYA in Russian 7 Jan 89 p 3

[Interview with V. Govallo, professor, under the rubric "Breakthrough to Immunity"; "Invisible Protection"]

[Abstract] Recent decisions by the USSR Ministry of Health have confirmed the blood test proposed by Professor V. Govallo for the early diagnosis of cancer, despite the opposition by the Institute of Oncology. The test has been shown to have an accuracy rate of at least 80 percent, with a 90-96 percent accuracy at some oncologic centers in determining individuals at risk. It is based on the observation by V. Govallo that a fall in the counts of the smallest lymphocytes precedes the onset of frank malignancy; the test led to the development of unique diagnostic instruments that are not available abroad. In addition, Govallo and his collaborators have developed an immune method for preventing spontaneous abortions by infusing lymphocytes from the husband into the woman at risk. Again, although the method was developed some time ago, its medical acceptance has been delayed until the present. A more recent contribution by Govallo's group has dealt with enhancement of the immune response by immunization with a combination of lymphocytes and bacterial antigens. Although this form of immune enhancement is still in the experimental stages, the results are very encouraging. It may be possible to treat many refractory infections in this manner, as well as use this method for generating an immune response against cancer cells by injecting them in combination with lymphocytes.

UDC 541.6:532.6

Effect of Chemical Processing Methods on Calcification, Hemocompatibility, and Immunogenic Properties of Xenopericardial Bioprostheses of Heart Valves

18400276 Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR. SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 1, Jan 89 (manuscript received 05 Jul 88) pp 56-58

[Article by B. A. Fursov, B. P. Mishchenko, V. V. Zaytsev, V. A. Dyatlov, L. V. Zaytsev, I. B. Rozanova, Ye. A. Tseytlina, L. A. Solomatina, and Ye. N. Matsulenko, Institute of Elementoorganic Compounds, USSR Academy of Sciences, Moscow; Institute of Cardiovascular Surgery, USSR Academy of Medical Sciences, Moscow]

[Abstract] Porcine and bovine bioprostheses treated with an aqueous solution of glutaric aldehyde are used successfully for correcting congenital and acquired valvular disease, but they are susceptible to calcification. The researchers here evaluate the effectiveness of various methods of chemical treatment for reducing calcification in xenopericardia, as well as the effect of those methods

on hemocompatibility and immunogenic properties of bioprostheses. Xenopericardium samples were treated with three methods: 0.625% aqueous solution of glutaric aldehyde (the control); 0.625% solution of glutaric aldehyde, with subsequent treatment with 1% solution of sodium dodecylsulfate; or saturation of the xenopericardium, which is stabilized with a 0.625% solution of glutaric aldehyde, with the polysaccharide polymer dextran. The degree of calcification was assessed 30 days after the samples were implanted in the subcutaneous cellular tissue of a rabbit. Dextran saturation proved to be the most effective method for inhibiting calcification. In a delayed hypersensitivity test in CBA mice, dextran saturation reduced the immunogenic properties of the biotissue to a much greater degree than did the other methods, especially in the early stages following implantation. Additional treatment of the xenopericardium with sodium dodecylsulfate or dextran saturation increased hemocompatibility more so than did the control method. References 8: 2 Russian, 6 Western.

Co-Agglutination Test for Tularemia Agent

18400223 Moscow LABORATORNOYE DELO in Russian No 10, Oct 88 (manuscript received 29 Jun 87) pp 64-65

[Article by O. V. Sivkova, Rostov-on-Don Scientific Research Antiplague Institute]

[Abstract] A highly specific and sensitive slide co-agglutination test based on SpA (protein A) has been developed for Francisella tularensis, using Soviet reagents. The key diagnosticum was prepared by incubating 0.1 ml of rabbit antiserum with 1.0 ml of a 10 percent suspension of the staphylococcal reagent for 1 h with mixing at room temperature, washing three times with 0.9 percent NaCl by centrifugation at 3000 rpm for 20 min, adjusting the sediment to a 2.5 percent suspension, and preservation with sodium merthiolate. Prepared in this manner, the slide co-agglutination showed a sensitivity for F. tularensis of 10^8 cells/ml. Rabbit antisera proved superior to equine antisera when used in a dilution of 1:800 and added in a volume of 0.05 ml per 0.5 ml of the staphylococcal preparation. Although the rabbit antiserum cross-reacted with a number of other bacterial genera in agglutination tests, the slide co-agglutination test exhibited exquisite specificity by giving positive reactions only with F. tularensis. References 11: 7 Russian, 4 Western.

UDC 579.843.1:579.222.577.152.344

Characteristics of Protease Activities of Vibrio Cholerae Strains and Mutants With Different Biological Properties

18400234a Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 9, Sep 88 (manuscript received 5 Mar 87) pp 7-10

[Article by V. S. Uraleva and M. M. Gulida, Rostov-on-Don Scientific Research Antiplaque Institute]

[Abstract] An analysis was conducted on the alkaline protease activities of 65 strains and mutants of Vibrio cholerae in relation to cholera toxin production and other biological properties. On agar cultures maximum protease activity was noted in 24 h. In general, cholerogenic strains were marked by high or moderate protease activities. Strains and mutants failing to produce the toxin showed lower levels of protease activity in about half the cases, and no protease activity was detected in one-sixth of the mutants and strains in this category. Protease designated type 1 was inhibited by (phenylmethyl) sufanol fluoride (PMSF), protease type 3 was inhibited by EDTA, and type 2 was inhibited by dithiothreitol or activated by EDTA. Types 1 and 3 proteases were thermolabile (partial inactivation after 30 min at 56°C and complete inactivation at 100C), while type 2 was thermostable. Cholera toxin-producing strains produced all three types of proteases, while two-thirds of the nontoxigenic strains produced type 3 protease, one-half produced type 2, and one-fifth showed type 1 activity. In general, hemolytic nontoxigenic strains largely displayed type 3 protease activity, while the hemolytic strains usually possessed type 2 protease. Tabular data are also provided which show a high degree of correlation between the presence of type 1 and 2 proteases, on one hand, and toxin production and other indicators of pathogenicity, on the other. References 12: 4 Russian, 8 Western.

UDC 579.861.083.13

Growth and Accumulation of Protein A (SPA) by Staphylococcus Aureus A-676 Grown on A Medium of Nonfoodstuffs

18400234b Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 9, Sep 88 (manuscript received 30 May 87) pp 24-28

[Article by G. P. Dubinina, Ye. V. Perelman, V. F. Bulk, Z. I. Yershova, A. K. Vargina and A. L. Vinnik, Central Scientific Research Institute of Vaccines and Sera imeni I. I. Mechnikov, USSR Ministry of Health, Moscow]

[Abstract] A nutrient medium based on tryptic hydrolysates of protein byproducts obtained from a tannery was developed for the cultivation of Staphylococcus aureus A-676. The purpose was to obviate the need for the conventional peptone-yeast medium used for the production of SPA, which is eight times more expensive. The results showed that SPA levels, determined by hemagglutination neutralization tests, after 6 h of growth were equivalent for the standard peptone-yeast medium, yielding titers of 1:10,240. The test media were also evaluated when various components were limited. Whereas in the standard peptone-yeast medium the primary factory affecting SPA yield is peptone, in the byproduct media such dependence on one factor was not evident. Figures 3; references 6: 4 Russian, 2 Western.

UDC 579.63:613.62

Effects of Pseudomonas Carnea—Actual Source of Microbial Insecticide—on Animal Bodies

18400242a Kiev MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 50 No 6, Sep-Oct 88 (manuscript received 28 Apr 87) pp 80-83

[Article by T. G. Omelyanets, All-Union Scientific Research Institute of Hygiene and Toxicology of Pesticides, Polymers and Plastics, Kiev]

[Abstract] Trials were conducted with Pseudomonas carnea, the source of a promising microbial insecticide carnicine, to determine potential pathogenicity of the intact cell on the mammalian organism. Studies with albino rats and mice demontrated that the live Ps. carnea cells were nonvirulent, nontoxic, noninvasive, noninfectious, and nonallergenic in sublethal doses. The LD_{50} values for rats and mice were, respectively, more than 10^9 and 10^7 cells on intraperitoneal administration, more than 10^{12} and 10^{10} cells when given per os, and more

than 10^{10} and 10^{9} cells on intranasal administration. The cause of death in animals administered large doses of microbes was evidently toxic metabolites released by the cells on their breakdown. This conclusion is based on the fact that the LD_{50} values were identical for living and dead cells, as well as the absence of the microbial cells in the blood and organs of the animals. References 7: 6 Russian, 1 Western.

UDC 579.841.11

Nonspecific Toxigenicity of Selected Pseudomonas Species

18400242b Kiev MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 50 No 5, Sep-Oct 88 (manuscript received 3 Jun 87) pp 83-86

[Article by N. D. Mikhnovskaya, I. I. Shevtsova, Ye. M. Ruban, L. N. Lysenko and I. A. Vasilevskaya, Kiev State University]

[Abstract] An evaluation was conducted on the possibility of a relationship between the entomopathogenic and phytopathogenic factors of selected species of pigmented Pseudomonas. The studies were conducted with Ps. aeruginosa, Ps. putida, Ps. aereofaciens, and Ps. fluorescens, as well as with the phytotoxic metabolite phenazine-1-carboxylate isolated from Ps. putida. Tests were conducted on watercress, wheat, and horseradish seeds and Aedes aegypti larvae. Exposure of the seeds and the larvae to the exogenous metabolites produced by the bacteria resulted in a 100 percent death rate of the mosquitoe larvae and a 20-40 percent reduction in seed germination. In addition, the culture conditions of the bacteria were also found to be a significant factor in the toxicity of their metabolites, with cultures grown on Czapek's medium yielding the most toxic culture fluids. Ps. fluorescens culture fluid also exhibited inhibitory activity on the growth of Bacillus subtilis, B. mesentericus, B. megaterium, Sarcina lutea, and a Mycobacterium sp., but not against E. coli. These observations demonstrate that the Pseudomonas species exhibit a wide spectrum of toxicity across phylogenetic lines, suggesting that during their evolution they did not develop any host or target preferences. References 8 (Russian).

UDC 579.842.23:611-018.54

Modifying Effects of Normal Human Blood Serum on EV76 Vaccine and Viruluent 363(1/1479) Strains of A Plague Bacterium

18400242c Kiev MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 50 No 5, Sep-Oct 88 (manuscript received 24 Nov 87) pp 87-92

[Article by V. P. Zyuzina, V. I. Tynyanova, A. N. Kravtsov and V. A. Khodova, Scientific Research Antiplague Institute, Rostov-on-Don]

[Abstract] A study was conducted on the effects of normal human serum on the virulence characteristics of a vaccine strain (EV76) and a virulent strain (363(1/1479)) of Yersinia pestis. The resultant data demonstrated the incubation of the cells with the serum for 18-24 h at 37°C modified the virulence determinants. The production of Fraction-1 antigen (envelope antigen) by both Y. pestis EV76 and Y. pestis 363(1/1479) was increased 4- to 8-fold; however, the increase was more pronounced in the former. In addition, incubation with the serum also induced serum resistance in approx. 0.1 percent of the Y. pestis EV76 cells and favored selection of Ca ion-dependent cells. Incubation with the serum had no effect on pigment absorption by the virulent Y. pestis strain. Exposure to serum had the obvious effect of enhancing the immunogenicity of Y. pestis EV76; however it may lead to greater virulence of the vaccine strain. References 11: 2 Russian, 9 Western.

UDC 614.31:[664.78+664.69]:[615.918:582.282]-07

Screening Yeast Strains Sensitive to the T-2 Toxin

18400319 Moscow VOPROSY PITANIYA in Russian No 6, Nov-Dec 88 (manuscript received 21 Jul 87) pp 67-68

[Article by E. V. Boltyanskaya, I. B. Kuvayeva, and Ye. A. Kroyakova, Laboratory of Sanitary and Nutritive Microbiology and Microecology, Nutrition Institute, USSR Academy of Medical Sciences]

[Abstract] The T-2 toxin is among the most toxic representatives of the trichothecin microtoxins (LD_{50} for various species of mammals, 3-10 mg/kg body weight). Because the most reliable method of testing for the toxin, gas-liquid chromatography, is complex and expensive, and thin-layer chromatography is not sensitive enough to provide reliable results, microbiological methods—which are easy to perform, inexpensive, and sensitive—are considered a good substitute. In an effort to find strains of yeast that are more sensitive than *Saccharomyces fragilis* 25-D and *Candida pseudotropicalis* 44pk (the latter can identify T-2 in concentrations of 0.6 γ/g or higher), the researchers here examined 76 yeast cultures from the all-union collection of microorganisms. A preliminary study of 15 arbitrarily chosen strains from nine genera revealed that only Saccharomyces representatives identified a minute sensitivity to a grain extract containing T-2. Further studies among Saccharomyces strains and taxonomic groups similar to the Saccharomyces genus revealed a sensitivity to the grain extract in seven strains of *S. cerevisiae*, one strain of *S. lactis*, two strains of *Kluyveromyces lactis*, and eight strains of *Kluyveromyces marxianus*. Of those, four strains—*S. cerevisiae* VKMU 351, *S. lactis* 459, and *K. marxianus* VKMU 126 and 433—displayed growth suppression features similar to those of *C. pseudotropicalis* 44pk and *S. fragilis* 25-D. *S. lactis* VKMU 459, however, demonstrated greater sensitivity than any of the other strains, including *S. fragilis* 25-D and *C. pseudotropicalis* 44pk. A study of threshold sensitivity to pure T-2 showed *S. lactis* 459

again more sensitive than either *S. fragilis* 25-D or *C. pseudotropicalis* 44pk. The researchers recommend the use of *S. lactis* 459 for detecting T-2 in grain extracts. References 3 (Russian).

Kinetic Method of Assessing the Effectiveness of Biocidal Action of Chemicals

18400330 Moscow MIKROBIOLOGIYA in Russian Vol 57 No 5, Sep-Oct 88 (manuscript received 18 May 87) pp 879-882

[Article by K. Z. Gumargaliyeva, I. G. Kalinina, S. N. Mironova, and S. A. Semenov, Institute of Chemical Physics, USSR Academy of Sciences, Moscow; Institute of Microbiology, BSSR Academy of Sciences, Minsk]

[Abstract] Biocides are used to prevent overgrowth. A kinetic method was developed to assess the effectiveness of the biocidal action both of water-soluble substances and non-water-soluble substances. The testing involved the most widely used chemical biocides—merthiolate, alkylbenzyldimethylammonium chloride, 1,6-diguanidinohexadihydrochloride, copper sulfate—and chemicals used as stabilizers and corrosion inhibitors. The biocidal activity was judged on the basis of suppression of the growth of microscopic *Aspergillus niger*. The researchers used a special hydrogel as the substrate, thus enabling a quantitative evaluation of the effect the chemicals had on the microorganisms. The chemicals were tested for biocidal action in the following manner. The water-soluble substances were placed in a nutrient medium that saturated the hydrogel. The non-water-soluble substances were carefully spread about the surface of a hydrogel membrane. For small quantities of the substances under study, their solutions were mixed with talc and also spread evenly about the surface. The nutrient medium was placed in the bottom of a Petri dish. Growth of the microscopic fungus was determined by measuring the biomass and by measuring the average colony radius. The ratio of initial to final biomass and the specific rate of growth were not functions of the initial spore concentration in the nutrient medium. Nor did the specific rate of growth depend on nutrient medium volume, which means that it was virtually independent of experiment conditions and was determined by the nature of the nutrient medium and the type of microorganism. Consequently, the second parameter can be used to evaluate the effectiveness of biocides. Introducing the biocides in greater concentration cause a diminution of the growth rate and a longer lag phase. The authors devised an exponential equation describing the relationship between lag-phase time and biocide concentration, with a constant that may also be used to evaluate biocidal action. They also introduce two other means of assessing biocide effectiveness: an equation written by N. M. Emanuel (1977) to describe inhibition of enzymatic reactions in the cell, and a graph whose plot may be used to preliminarily evaluate in-polymer concentration. Figures 3, references 3 (Russian).

UDC 577.391;538.56

Effects of Nonthermal-Intensity Microwaves on Body Weight in Rats

18400183h Moscow RADIOBIOLOGIYA in Russian Vol 28 No 4, Jul-Aug 88 (manuscript received 2 Jun 87) p 561-563

[Article by I. V. Koveshnikova and Ye. N. Antipenko, Kiev Scientific Research Institute of General and Communal Hygiene imeni A. N. Marzeyev

[Abstract] Male and female outbred rats were used to test the effects on weight of nonthermal-intensity microwave irradiation over a period of 45 days. The animals were irradiated for 7 or 14 h/day with 10-60 $\mu W/cm^2$ continuous (2375 MHz) or intermittent (2750 or 546 MHz) radiation. A significant weight lag was noted within 1-2 weeks of exposure, reaching a maximum (22 percent) after 4-5 weeks. At the end of the experiment the differences in weight between the unexposed rats and the rats exposed to the 2375 and 2750 MHz waves diminished somewhat. The difference between the control and the 546 MHz animals became insignificant. The differences were attributed to the stimulatory action of the microwave irradiation on the thyroid gland. The results also show that the type of microwave irradiation that may be encountered by man has biological sequelae. Figures 1; references 11: 9 Russian, 2 Western.

Delineation of Frequency-Dependent Biological Effects of EHF Waves

18400212 Kishinev ELEKTRONNAYA OBRABOTKA MATERIALOV in Russian No 3, May-Jun 88 (manuscript received 15 Mar 86) pp 63-65

[Article by V. D. Iskin, Kharkov]

[Abstract] A mathematical analysis was conducted on the evaluation of biological effects of EHF waves, with a view toward devising a simpler and yet reliable method for such studies. The basic approach is based on the fact that a high figure of merit for a biological system exposed to microwave irradiation requires an analysis of the biological response at every frequency. However, whenever with a certain frequency a resonance response is obtained in the biological system, that frequency is biologically active. Distances between different portions of the biological system that display a maximum response may be analyzed along a given axis in the system as different points on an EHF emission-induced standing wave in the system. The method may be expanded into a multimode method of analysis by creation of an interference pattern at the surface of biological system and in the latter case the error of determination is significantly reduced, by a factor of $2\sin \alpha/2)^{-1}$. Figures 3; references 4 (Russian).

Study of K^+, H^+, and Cl^- Currents Across Membranes of Erythrocytes Irradiated With Radio-Frequency Electromagnetic Emissions

18400237a Moscow BIOFIZIKA in Russian Vol 33 No 5, Sep-Oct 88 (manuscript received 9 Jun 86; in final form 29 Dec 86) pp 837-840

[Article by Yu. A. Kim, Yu. V. Kim, I. K. Kasimbekov and B. S. Fomenko, Institute of Biological Physics, USSR Academy of Sciences, Pushchino, Moscow Oblast]

[Abstract] A comparative analysis was conducted on the effects of radio-frequency (460 MHz) irradiation and heat on K^+, H^+, and Cl^- currents across erythrocyte membranes to further define the mechanism of action of electromagnetic radiation on active membrane transport. The erythrocytes were derived from Wistar rats and irradiated for 20 min with a specific power input of 280 W/kg in 0.3 M sucrose solution, adjusted to pH 7.4 with NaOH, containing 10^{13} erythrocytes per liter. At the end of the 20 min period the temperature of the suspension rose to 39°C. Parallel measurements were conducted with ion-selective electrodes on an unirradiated suspension heated to 39°C over the same period of time. In comparison with a control suspension maintained at 0°C, noticeable changes were noted only in the transport of K^+. The first phase of the response (2-3 min) was marked by an increase in the extracellular concentration of K^+ from 1.9×10^{-7} M (control) to $5.2\text{-}5.3 \times 10^{-7}$ M in the heat and radiofrequency experiments. Subsequently (second phase), measurements of the rate of efflux at 7 min yielded values of 115 nmoles/min for the control samples, and 60.5-62.0 nmoles/min for the radiofrequency and heat experiments. Thus, the results were consistent with the interpretation that the effects of the 460 MHz band were due to heat effects. Figures 1; references 20: 3 Russian, 17 Western.

Effects of Infralow Frequency Alternating Magnetic Fields on Neutrophil Function in Hypokinetic Rats

18400237b Moscow BIOFIZIKA in Russian Vol 33 No 5, Sep-Oct 88 (manuscript received 27 Oct 86; in final form 2 Mar 87) pp 863-866

[Article by N. A. Temuryants and A. V. Mikhaylov, Simferopol State University imeni M. F. Frunze]

[Abstract] To further expand the scope of knowledge on the effects of low frequency (8 Hz) alternating electromagnetic fields on physiological functions, a study was conducted on the effects seen with neutrophil function in hypokinetic rats. Outbred white rats (180-200 g) were exposed to 8 Hz alternating electromagnetic fields with 5 μT induction for 3 h per day for 3 days, with the status of the neutrophils followed in control and experimental animals for 45 days. Cytochemical examination of the neutrophils as well as evaluation of phagocytic functions demonstrated that hypokinesia exerted an adverse effect, with the percentage of phagocytic cells dropping to about 30 percent from a control value of about 35 percent, and the phagocytic index falling from about 10.9 to about 4.8 after 9 days of hypokinesia. Exposure of control animals to the electromagnetic field showed enhancement of cytochemical parameters as well as stimulation of phagocytic activities, while exposure of hypokinetic animals resulted in maintenance of essentially normal neutrophil functions. These findings were consistent with the interpretation that the 8 Hz magnetic field enhanced nonspecific immunity in animals with limited mobility. References 10: 9 Russian, 1 Western.

Acoustic Detection of mm-Band Energy Absorption by Biological Objects

18400237c Moscow BIOFIZIKA in Russian Vol 33 No 5, Sep-Oct 88 (manuscript received 2 Sep 87) pp 893-894

[Article by I. G. Polnikov and A. V. Putvinskiy, Institute of Radioengineering and Electronics, USSR Academy of Sciences, Moscow]

[Abstract] An acoustic approach to the detection of absorbed mm-band electromagnetic energy by biological objects has been devised on the basis of recording thermoelastic oscillations induced by the modulated emission. The technique is a derivation of the photoacoustic spectroscopy used with emissions in the optical band. Comparative measurements that were conducted with quartz cuvettes, polyethylene capillaries and human palmar skin demonstrated that the amplitude of the detected acoustic signal was proportional to the power input. The thermoelastic oscillations were induced in the object itself and in the layer of air adjoining the target. The experimental studies demonstrated that the approach was suitable for both in vivo and in vitro studies. Figures 1; references 8: 5 Russian, 3 Western.

UDC 616-099.4:591.147:591.81

Pathogenesis of Acute Poisoning With Viper Venom

18400224 Ashkhabad ZDRAVOOKHRANENIYE TURKMENISTANA in Russian No 10, Oct 88 pp 10-17

[Article by D. B. Gelashvili, A. T. Berdyyeva and B. N. Orlova, Faculty of Biology, Gorky State University imeni I. N. Lobachevskiy; Turkmen Order of People's Friendship State Medical Institute]

[Abstract] A study was conducted on the early stages of pathogenesis in 180-200 g white rats following intraperitoneal administration of viper venom in a dose of 5 mg/kg. Analysis was conducted in terms of stress response as evident in blood levels of ACTH, insulin, aldosterone, and renin activity and in terms of histopathology and histochemistry of target organs (liver, kidneys, lungs). As monitored over a 5- to 90-min period, marked hormonal fluctuations were noted, terminating in an almost 15-fold increase in ACTH, a 3-fold increase in insulin, a 5-fold increase in aldosterone, and a 23-fold decrease in renin activity. The data were interpreted to indicate an extreme disruption of normal homeostatic mechanisms and direct tissue damage. The latter was confirmed by severe dystrophic changes and histopathologic demonstrations of alternations in the tissue concentrations of DNA, RNA, and of altered SDH activity. The initial fluctuations in the endocrine factors (within 5-30 min) demonstrated that the biological control mechanisms were overcome by direct tissue damage and were unable to compensate for the unremitting progression of destructive changes. References 21 (Russian).

UDC 616.31:[547.95:547.943].07

Comparative Assessment of Opioid Activities of Enkephalin and Dermorphin Congeners

18400233a Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 51 No 5, Sep-Oct 88 (manuscript received 30 Sep 87) pp 17-20

[Article by O. N. Chichenkov, N. V. Sumbatyan, O. N. Ryabtseva, G. A. Korshunova, V. A. Shorr and Yu. P. Shvachkin, Chair of Pharmacology, Therapeutic and Sanitary Hygienic Faculties, 1st Moscow Medical Institute imeni I. M. Sechenov; Chair of Chemistry of Natural Compounds, Moscow State University imeni M. V. Lomonosov]

[Abstract] A series of short congeners of enkephalin and dermorphin were tested on guinea pig ileum and mouse vas deferens for their ability to inhibit contractions elicited by electric stimulation and, thus, to identify peptides reacting with μ and δ receptors. The 24 peptides tested in this manner contained amino acid substitutions at positions 4 and 5 and demonstrated opioid activities. Six compounds were found to react equally well with both types of receptors. Finally, one peptide (Tyr-D-Ala-Phe-Gly-DL-Tal-OH) was identified as a δ-agonist and another as a μ-agonist (Tyr-D-Phy-Gly-Tal-Leu-OH) with activities on a par with activities of conventional standard peptides DADLE and DAGO. These novel peptides may be used to further define the various optioid receptors and their functional specificities. The presence of a bulky substituent at position 5 (nucleoamino acid, 3-nitrotyrosine) enhanced affinity for the δ receptors, while their presence at position 4 increased affinity for the μ receptors. References 9: 1 Russian, 8 Western.

UDC 615.357:577.175.852].017:615.212].076.9

Effects of Angiotensin and Naloxone on Nociceptive Sensitivity in Rabbits With Electrical Stimulation of Skin and Dental Pulp

18400233b Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 51 No 5, Sep-Oct 88 (manuscript received 17 Jul 87) pp 23-27

[Article by O. S. Rayevskaya and O. V. Fedoseyeva, Scientific Research Institute of Normal Physiology imeni P. K. Anokhin, USSR Academy of Medical Sciences, Moscow]

[Abstract] Electrical stimulation of skin and dental pulp in 2.5-3.0 kg chinchilla rabbits was used to assess the analgesic effects of angiotensin II, as modified by naloxone and saralasin. Nociception was evaluated on the basis of changes in evoked potentials in the somatosensory cortex, particularly as regards the amplitude of the negative-positive component with a latent period of 20-40 msec. In the unanesthetized animals administration of angiotensin II into the third ventricle (50 ng/kg) or intravenously (5 mg/kg) led to a reduction in the amplitude of the evoked response following electrical stimulation of dental pulp, but did not affect nociception associated with skin stimulation. This effect of angiotensin II was abolished by intraventicular administration of saralasin (130 ng/kg). Intraventricular administration of naloxone (50 μg/kg) enhanced the amplitude of the evoked response to electrodental stimulation without affecting the response to the electrocutaneous stimulation. In addition, administered in this manner, naloxone counteracted the effects of angiotensin II. These observations demonstrated that different forms of nociception involve different peptide mechanisms. The selective involvement of angiotensin II suggests the presence of angiotensin II receptors in trigeminal nuclei and the absence of such receptors in the posterior horns of the spinal cord. Figures 3; references 15: 4 Russian, 11 Western.

UDC 615.214.31.076.9

Significance of Antihypoxic Properties of Etimizole in Its Nootropic Effects

18400233c Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 51, No 5, Sep-Oct 88 (manuscript received 25 Feb 87) pp 27-30

[Article by Yu. V. Zaytsev, P. D. Shabanov, S. I. Bogoslovskaya, W.A. Kraus, H. D. Fischer, E. Rudolf and Ch. Wustman, Department of Pharmacology imeni S. V. Anichkov, Institute of Experimental Medicine, USSR Academy of Medical Sciences, Leningrad; Carl Gustav

Karus Institute of Pharmacology and Toxicology, Dresden, GDR]

[Abstract] Animal and human trials were conducted with etimizole to correlate its antihypoxic and nootropic (brain stimulant) properties. Antihypoxic effectiveness of etimizole was demonstrated in rat studies in which administration of 20 mg/kg etimizole 20-40 min before anoxemic or hypobaric hypoxia reduced the mortality figures. These observations were confirmed in studies on 26 volunteers treated with 100-200 mg etimizole 1 h before stress testing on an exercise bicycle. In the latter case, tolerance of stress was improved without increased oxygen consumption, as a result of more efficient hemodynamics and heart function. In further studies on rats, etimizole was also effective in overcoming amnesia in those situation where hypoxic mechanisms were prominent (mechanical brain injury, actinomycin D administration, hypobaric hypoxia), in each case exceeding in effectiveness other well-established cerebral stimulants (meclophenoxate and piracetam). A singular feature of etimizole was that it was effective as a single intraperitoneal administration (3 mg/kg), whereas much larger doses (100-200 mg/kg) of the other agents were required. References 7: 2 Russian, 5 Western.

UDC 615.214.31.015.4:612.886.2].076.9

Effects of Dimephosphone on Cerebral Circulation and Oxygen Tension in Wakeful Rabbits in the Norm and Subjected to Rocking Motion

18400233d Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 51 No 5, Sep-Oct 88 (manuscript received 25 Nov 87) pp 35-38

[Article by A. I. Beketov and N. A. Skoromnyy, Chair of Pharmacology With Clinical Pharmacology Course, Crimean Medical Institute, Simferopol]

[Abstract] Wakeful rabbits were employed to assess the role of the vestibulo-vascular reflexes in pathogenesis of motion sickness in tests which subjected the animals to a rocking motion (30-34 cpm) for 1 h, with monitoring of cerebral hemodynamics. The rocking led to an increase in the regional blood flow in the frontal, occipital, and temporal cortical tissues, accompanied by a moderate reduction in the oxygen tension in these tissues in the face of hypotension and bradycardia. Concomitantly, these changes were accompanied by about a 35 percent increase in cerebral outflow. Cessation of rocking was followed by recovery of essentially baseline values within 30-40 min. Intravenous administration of dimephosphone (250 mg/kg) to control and experimental rabbits led to significant reductions in the regional blood flow patterns as well as in the outflow from the cranial sinuses, accompanied by insignificant tendencies toward a reduction in oxygen tension, without any telling effects on blood pressure or the heart rate. These findings confirmed the general impression that motion sickness may be accompanied by profound cerebrovascular dysfunction and that, to some extent, pharmacologic agents may be efficacious. References 12 (Russian).

UDC 615.217.24.015.4:[616.74-005-092: 612.014.477.064].07

Effects of Propranolol and Guanethidine on Muscle Blood Flow in Antiorthostatic Hypokinesia

18400233e Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 51 No 5, Sep-Oct 88 (manuscript received 25 Nov 87) pp 44-46

[Article by L. D. Makoyeva, Ye. D. Li, V. A. Musev, K. A. Memetov, T. F. Belinskaya and A. G. Margaryan, No 2 Chair of Internal Diseases and Chair of Pharmacology With Clinical Pharmacology Course, Moscow Medical Stomatological Institute imeni N. A. Semashko]

[Abstract] ^{133}Xe clearance studies were conducted on a group of healthy men to determine the effects of antiorthostatic hypokinesia on blood flow in the gastrocnemius muscle and to assess the possibility of correcting any adverse changes by administration of propranolol or guanethidine. The purpose was to model the reported deterioration of circulation in the lower extremities of cosmonauts during space flight. The experimental data demonstrated that the rate of blood flow fell significantly during a 6 h period in the antiorthostatic position and that the degree of deterioration was proportional to the angle (-7 to -30°). Administration of propranolol (80 mg) or guanethidine (12.5 mg) 30 min before the test was without beneficial consequences: with propranolol there was simply no improvement; with guanethidine the blood flow was further compromised. References 5: 3 Russian 2 Western.

UDC 615.217.34.03:615.285.7.099].076.9

Variable Effects of M-Cholinolytics in Chlorofos Intoxication

18400233f Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 51 No 5, Sep-Oct 88 (manuscript received 15 Oct 87) pp 86-89

[Article by A. B. Kosmachev, I. M. Kosmacheva and S. M. Chigareva, Institute of Toxicology, USSR Ministry of Health, Leningrad]

[Abstract] A comparative study was conducted on the effects of tributam methiodide, cyclosyl methiodide, glipin methiodide, methasin [metatsin], and atropine methiodide, in protecting white mice against chlorofos (trichlorfon) and carbachol (carbocholine). The anticholinergics were administered subcutaneously and the cholinomimetics intramuscularly, with the protective effects assessed from changes in the LD_{50} values of chlorofos or carbachol and the anticholinergic effects from changes in ED_{50} of Aceclidine in salivation tests. The results demonstrated that the anticholinergic agents

were equally effective against the direct cholinomimatic (carbachol), but showed variable effectiveness against chlorofos (an indirect cholinomimetic that acts by inactivating acetylcholine esterase). Consequently, testing of the anticholinergics against both categories of cholinomimetics may be used to assess their mechanism of action. In the case of chlorofos and other organophosphorus compounds, the effects of M-cholinolytics depends on the ratio of their effects on pre- and postsynaptic receptors. However, agents that act preferentially on the pre-synaptic receptors may be expected to be less effective in overcoming the effects of agents such as chlorofos. References 6: 2 Russian, 4 Western.

UDC 612.822:1:547.95:547.943].015.4:[615.33:573.245

Effects of Recombinant -Interferon on Specific Ligand Binding to μ- and δ-Receptors in Rat Brains

18400248f Moscow BYULLETEN' EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 106 No 9, Sep 88 (manuscript received 17 Sep 87) pp 307-309

[Article by L. F. Panchenko, T. N. Alyabyeva, O. B. Petrichenko, V. V. Bumyalis and A. M. Balashov, Laboratory of Biochemistry, All-Union Scientific Center for Drug Addiction, Moscow]

[Abstract] An analysis was conducted on the potential opioid-like activity of recombinant α-interferon (RI), employing μ- and δ-receptor preparations derived from the brains of 180-220 g male rats. Radioimmunoassay binding studies with ^{3}H-D-ala^2, D-leu^5-enk[illegible]alin, a δ-receptor agonist, yielded a K_i = 8.50 + over - 2.60 U.10^{-3}/ml with RI. In the case of the μ-receptor agonists ^{3}H-morphine, ^{3}H-dihydromorphine, and ^{3}H-RX 783006 the respective inhibition constants obtained with RI were, respectively, 3.25 + over - 0.35, 4.28 + over - 0.81, and 6.51 + over - 1.27 U.10^{-4}/ml. In addition, RI in concentrations below 10^5 U/ml had no effect on the binding of naloxone, but in a concentration of 5 x 10^3 U/ml enhanced naloxone binding (an effect reversed with 100 mM NaCl). These observations demonstrated that the affinity of RI for the δ-receptors was greater by an order of magnitude than for the μ-receptors, a selectivity attributed to the peptide component of RI since the carbohydrates present on the native molecule are absent. The effects on naloxone binding were attributed to allosteric effects, with the implication that enhanced binding was attributed to the missing carbohydrate moieties, since native interferon has no such effect. References 9: 4 Russian, 5 Western.

Pharmacological Modification of the Body's Resistance to Hypoxia

18400254 Frunze ZDRAVOOKHRANENIYA KIRGIZII in Russian No 5, Sep-Oct 88 pp 26-30

[Article by A. Z. Zurdinov, Chair of Pharmacology, Kirghiz State Medical Institute]

[Abstract] Outbred male rats (180-240 g) were employed in a study designed to define the parameters under which susceptibility of hypoxia may be modified by pharmacologic agents. The results were evaluated in terms of survival times under various conditions (seasonal variations, temperature effects, adaptation to hypoxia, etc). In general, trials with the agents in question demonstrated that they may be classified on the basis of their practical applicability. Bemitil, tonibral, BZ-80, euclidan, gutimin, and pyracetam, for example, were found effective when used in the pretreatment mode. Other agents—among them S-2, BZ-80, and bemitil—were also found effective in enhancing the effectiveness of preadaptation to hypoxia when administered during the high-altitude adaptive procedures. BZ-80 was found effective when administered after a period of adaptation and appears to have universal applicability in mitigating the effects of hypoxia.

UDC 615.213:547.898].07

Modelling the Structure-Activity Relationship. Macrocyclic Anticonvulsants

18400326 Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 22 No 10, Oct 88 (manuscript received 09 Jul 87) pp 1230-1236

[Article by O. A. Rayevskiy, A. M. Sapegin, N. V. Lukyanov, V. V. Chistyakov, G. I. Vankin, V. P. Solovyev, A. F. Solotnov, V. V. Tkachev, L. O. Atovmyan, A. S. Shtenanek, T. N. Kudrya, A. M. Pinchuk, V. Ye. Zubareva, and I. I. Bulgak, Institute of Physiologically Active Substances, USSR Academy of Sciences; department of Institute of Chemical Physics, USSR Academy of Sciences, Moscow Oblast; Institute of Organic Chemistry, UkSSR Academy of Sciences, Kiev; Institute of Chemistry, MSSR Academy of Sciences, Kishinev]

[Abstract] Macrocyclic polyethers are capable of forming complexes with various ions of biometals and alkyl ammonium fragments. The complexes are responsible for processes such as enzyme catalysis, inhibition, replication, storage, and transmission of genetic information; immune response; and balance of ion concentrations inside and outside the cell. The physiological activity of synthetic macrocyclic compounds, however, remains a little-studied area. The authors present the results of modelling of the structure-activity relationship in a number of Crown ethers, based on their anticonvulsive effects. The ability to form complexes with biotarget cations is assumed to underlie the biological activity of macrocyclic compounds. Since macrocyclic complexones are basically membranotrophic, a change in surface charge of the cell membrane represents the most probable manifestation of their complexing properties. The biological activity of the Crown ethers is also effected through direct electron-donor interaction with membrane regulator structures, with a small number of electron-donor complexes participating in the interaction with the biotarget. The results of discriminant analysis performed on the basis of 47 descriptors from three

classes—information-topological, molecular, and substrate-receptor complex descriptors—confirmed the important role of complexing ability in the formation of the psychotropic activity of macrocyclic compounds, indicating the need to make allowances for possible steric hindrances in the interaction between macrocyclic compound and biotarget. Among the highly active compounds were ligands whose molecules had three easily accessible electron-donor centers, which suggests that the interacting side of the ligand is a triangle formed by electron-donor oxygen atoms. Quantitative determinations of the contributions of the descriptors to biological activity were not possible, because the active triangle dimensions and the electron-donor properties of the centers make up such triangles did not vary widely enough. An increase in anticonvulsive activity correlated with a decrease in the minimal distance between active centers and an increase in their electron-donor capacity in relation to the third active center. Figures 2, references 26: 21 Russian, 5 Western.

UDC 615.353.577.175.82:616.89.008

Brain Metabolism of Biogenic Amines in Relation to Antialcoholic Effects of the Opioid Peptide Dermorphin

18400209b Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 303 No 3, Nov 88 (manuscript received 5 May 88) pp 746-749

[Article by Ye. A. Gromova, N. V. Bobkova, L. A. Plakkhinas, V. I. Deygin and Ye. P. Yarova, Institute of Biological Physics, USSR Academy of Sciences, Pushchino, Moscow Oblast; Scientific Research Institute of Experimental Cardiology, All-Union Cardiological Research Center, USSR Academy of Medical Sciences, Moscow]

[Abstract] Experimental therapeutic trials were conducted with dermorphin, a heptapeptide isolated from the skin of a South American frog, to assess its efficacy in limiting alcohol consumption in rats. The study was conducted with 180-220 g male Wistar rats exposed to long-term consumption of 20 percent ethanol solution in place of water. Subsequently, the animals were treated with 150-200 μg/kg/day dermorphin intraperitoneally for 10 days and given a choice of water or a 15 percent ethanol solution. The data showed that in the case of most animals treatment with dermorphin led to a 74 percent reduction in alcohol intake: no effect was observed in 5 of the 18 experimental animals. Of special significance was the fact that the reduction in alcohol intake persisted for the 2 month period of observation. Additional studies on metabolism of biogenic amines in various brain formations (hippocampus, brain stem, cerebral cortex) demonstrated that dermorphin exerted variable effects. However, in the case of the hippocampus dermorphin treatment led to highly significant reductions (P is less than 0.001) in the levels of norepinephrine and serotonin, and to significant reductions (P is less than 0.05) in the levels of homovanillic acid and 5-hydroxyindoleacetic acid. These observations demonstrated a relationship between the antialcoholic effect of dermorphin and its effects on the metabolism of biogenic amines in the hippocampus, a primary center for the control of eating and drinking behavior. Figures 3; references 15: 8 Russian, 7 Western.

UDC 612.338+612.57

Effects of Short-Term Hyperthermia on Catecholamine Synthesis in Rats

18400210b Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 303 No 5, Dec 88 (manuscript received 20 Apr 88) pp 1277-1279

[Article by Kh. A. Mezidova, F. F. Sultanov, academician, Turkmen SSR Academy of Sciences, and B. N. Manukhin, Institute of Physiology and Experimental Pathology of Arid Regions, Turkmen SSR Academy of Sciences, Ashkhabad; Institute of Developmental Biology imeni N. K. Koltsov, USSR Academy of Sciences, Moscow]

[Abstract] Various forms of stress are known to enhance catecholamine synthesis, although data on the effects of hyperthermia appear to be lacking. In view of this, a study was conducted on the effects of hyperthermia on norepinephrine and dopamine in 180-250 g male Wistar rats. The animals were placed in special chambers and exposed to a temperature of 45 degrees C for 30 or 60 min. Immediately after exposure and 24 h later the levels of the catecholamines were analyzed in selected regulatory and target tissues. After 30 minutes the rectal temperature increased to 39.6 degrees C from a baseline level of 37.2 degrees C. Norepinephrine synthesis showed a 1.5-fold increase in the cardiac atria, insignificantly increased in the hypothalamus, and decreased 2-fold in the adrenal glands. After 60 minutes the rectal temperature increased to 40.6 degrees C and was accompanied by a 1.8-fold increase in the synthesis of norepinephrine in the hypothalamus and a 2-fold increase in the adrenals, while decreasing to control levels in the atria. Measurements conducted after 24 h revealed norepinephrine synthesis remained elevated in the hypothalamus and the adrenal glands (1.7-fold) and was slightly depressed in the atria. Only after 30 minutes of hyperthermia in the atria was dopamine synthesis seen to be enhanced by 1.8-fold, and almost to a statistically significant extent in the hypothalamus. Dopamine synthesis was depressed after 60 min and 24 h. These findings demonstrated the lack of a direct correlation between synthesis and utilization of catecholamines, but indicated that catecholamine synthesis is affected by hyperthermia in both regulatory (adrenals, hypothalamus) and target (cardia) organs in the rat. References 10: 6 Russian, 4 Western.

UDC 612.822.3+612.78

Effects of Selected Neuropeptides on Electrical Activity of Brain Structures in Rabbit

18400225 Kiev FIZIOLOGICHESKIY ZHURNAL in Russian Vol 34 No 5, Sept-Oct 88 (manuscript received 2 Nov 86) pp 38-44

[Article by O. S. Papsuyevich and V. D. Bakharev, Institute of Organic Synthesis, Latvian SSR Academy of Sciences, Riga]

[Abstract] The study reported here represents an extension of earlier research by the authors involving the effects of selected neuropeptides on the electrical behavior of subcortical formations. The study was conducted with the intravenous administration of des-9-glycine-[8-arginine]vasopressin (50 μg/kg), LH-RH (150 μ/kg), insulin (2.5 U/kg), hexapeptide 52-57 of nerve growth factor (250 μg/kg), or tetrapeptide 122-125 of human leukocytic interferon (250 μg/kg) to 2 kg chinchilla rabbits with stereotaxically imbedded electrodes in the formations of interest. Every peptide tested was seen to activate the electrical activity of the CNS. Maximum effects consisted of depression of the delta waves and enhancement of beta waves. In most cases the theta band became less pronounced; in a few cases the theta waves became more pronounced, but only in the hippocampus. However, following administration of des-9-glycine-[8-arginine]vasopressin, the hippocampal theta activity

always increased. Alpha rhythms generally were enhanced, but less so than the beta waves. Gamma waves remained unaffected by the administration of the peptides under study. The effects of des-9-glycine-[8-arginine]vasopressin were most pronounced in the hippocampus, while those of LH-RH predominated in the posterior hypothalamus, and the effects of the hexapeptide and the tetrapeptide were particularly strong in the anterior hypothalamus. In the case of insulin all of the brain formations appeared to be equally susceptible. These findings provided further confirmation of the previous work on the activating effects of these peptides on the CNS, including learning and memory, and their variable effects may account for the differences seen in various psychometric studies. On balance, the electrophysiological observations obtained here point to the pleiotropic nature of the neuropeptides. Figures 1; references 21: 12 Russian, 9 Western.

UDC 612.115+611.018

Effects of Multiple Intramuscular Injections of Difensin on Anticoagulating System and Angioarchitectonics of Skeletal Muscles

18400211b Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 304 No 2, Jun 89 (manuscript received 22 Mar 88) pp 494-498

[Article by B. A. Kudryashov, M. V. Kondashevskaya, L. A. Lyapina, V. N. Kokruakov, V. Ye. Pigarevskiy and G. M. Aleshina, Moscow State University imeni M. V. Lomonosov; Scientific Research Institute of Experimental Medicine, USSR Academy of Medical Sciences, Leningrad]

[Abstract] Animal studies were conducted with diphensin [difensin], a cationic protein isolated from rabbit neutrophils and shown to possess antimicrobial and anticoagulant properties, to determine whether it would stimulate angiogenesis. The experiments were conducted with 180-210 g albino male rats injected intramuscularly with difensin (125 μg/kg) daily for 14 days. The results showed that prolonged administration of difensin led to a 1.3-fold reduction in nonenzymatic fibrinolytic activity was also depressed somewhat (P0.2), but fibrinogen levels were not affected. Histologic examination of the skeletal muscles revealed an increase in the number of small blood vessels (d)of capillaries and arterioles, but not of the venules. These preliminary findings have provided the first demonstration that the scope of action of diphensin encompasses angiogenesis. Figures 1; references 145: 6 Russian, 7 Western, 1 Hungarian.

UDC 612.822.6:578.089.843

Correction of Motor Dysfunction in Rats Following Homotopic Grafting of Embryonal Cerebral Cortex

18400211c Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 304 No 2, Jun 89 (manuscript received 22 Mar 88) pp 502-505

[Article by V. V. Senatorov, I. I. Stepanov, G. P. Obukhova and G. A. Vartanyan, Institute of Experimental Medicine, USSR Academy of Medical Sciences, Leningrad]

[Abstract] Trials were conducted on the efficacy of syngeneic, embryonal homotopic cortical grafts in facilitating correction of motor dysfunction in adult rats induced by excision of a 12 mm^2 area of the left motor cortex controlling movements of the right posterior extremity. The study was conducted with adult wistar rats trained in certain motor skills, with the implants derived from 16 days old embryos. Physiological monitoring of the recipients revealed noticeable improvements in motor functions within 24 h of grafting, with further significant recovery observed on days 4-9. A slowdown in the recovery pattern was evident in the 9-17-day period, and further improvements were noted after day 19. Histologic sections of the recipient brains showed anatomic restitution of connections between the host and donor tissues. These observations suggest that trophic substances may have been secreted by the donor tissues that facilitated neuronal growth and anatomical patency, and suggest that this line of research should be pursued with a view toward eventual management of brain lesions. Figures 3; references 14: 8 Russian, 6 Western.

UDC 612.8.349.8.84.841.1

Compensation of Experimental Diabetes in Rats by Transplantation of Embryonal Pancreatic Tissue into Anterior Eye Chamber

18400211d Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 304 No 2, Jun 89 (manuscript received 21 Jun 88) pp 506-508

[Article by T. M. Tretyak, A. V. Kulikov, M. I. Arbuzova, L. K. Staroseltseva, O. S. Gorbatyuk, Ye. I. Goufman and I. G. Akmayev, Institute of Biological Physics, USSR Academy of Sciences, Pushchino, Moscow Oblast; Institute of Experimental Endocrinology and Hormone Chemistry, USSR Academy of Medical Sciences, Moscow]

[Abstract] A brief survey is presented of experimental results obtained in rat studies on correction of alloxan-induced diabetes by transplantation of embryonal pancreatic tissue into the anterior eye chamber of the diabetic recipients. Endocrinological monitoring of the recipient rats for 3 to 12 months in the absence of immunosuppressants showed that immunoreactive insulin attained normal baseline levels. Neocortical and brain stem levels of neurotransmitters (epinephrine and norepinephrine) rose to control values, as did uptake of ^{3}H-leucine. These observations demonstrated that transplantation of functional embryonal pancreatic tissue into an immunoprivileged site led to long-term compensation of alloxan-induced diabetes in adult rats. Preliminary studies also showed that a xeno-transplant of human pancreatic tissue in the rat anterior chamber was equally effective in correcting biochemical indicators in diabetic rats. On the basis of these results, it appears that

further studies should be conducted on pancreatic transplants in privileged sites. Tables 1; references 14: 4 Russian, 10 Western.

UDC 612.826.4.018.06:612.821.7].06:613.863

Delta-Sleep Peptide in Blood and Hypothalamus in Rats With Different Tolerances of Emotional Stress

18400248a Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 106 No 9, Sep 88 (manuscript received 4 Jan 88) pp 264-266

[Article by R. M. Saliyeva, Ye. V. Koplik, Z. A. Kamenov and A. B. Poletayev, Laboratory of Emotion Physiology, Institute of Normal Physiology imeni P. K. Anokhin, USSR Academy of Medical Sciences, Moscow]

[Abstract] The demonstration that the delta-sleep peptide (DSP) is involved in the mechanisms responsible for emotional stability led to the design of a study intended to compare its baseline levels in the blood and the hypothalamus in animals differing in stress tolerance. The experiments were conducted with adult male Wistar rats that were categorized as to emotional stability on the basis of the tail flick test and cardio-respiratory dynamics and were subsequently subjected to electrical stimulation for 1.5 or 3 h while immobilized. DSP was assayed by a solid-phase enzyme immunoassay, with anti-DSP antibodies raised in rabbits and with the analysis performed on acetic acid extracts of the blood and the hypothalamus. The analytical data revealed considerable differences in the DSP levels of the stable animals and the stress-prone animals. After 1.5 h of stress, the blood levels of DSP in the tolerant animals rose by 171.5 percent, and the hypothalamic levels, by an average of 21.79 percent. In the stress-prone rats, the corresponding increases were 81.26 and 101.4 percent. In the 3 h stress test, the blood levels of DSP fell by an average of 50.85 percent in the tolerant animals by comparison with the 1.5-h tests, while the hypothalamic levels showed an increase of 70.18 percent. The corresponding parameters in the labile rats showed a 16.24 percent decrease in the blood levels and a 81.25 percent increase in the hypothalamic levels. The marked differences observed between the stress-tolerant and stress-prone animals in this study support the contention that DSP, along with other neuropeptides, is intimately involved in psychological stress mechanisms. References 8: 7 Russian, 1 Western.

UDC 616.36-005.3+616.37-002]-092.9-07:616.36-02:615.212.7:547.95

Experimental Study of Liver-Sparing Effects of Combination of Transcranial-Transcutaneous Electrostimulation and Dalargin (Synthetic Analog of Leu-Enkephalin)

18400248b Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 106 No 9, Sep 88 (manuscript received 18 Mar 88) pp 266-268

[Article by M. I. Kuzin, A. A. Karelin, R. N. Korotkina, N. V. Babkina and B. M. Shloznikov, Institute of Surgery imeni A. V. Vishnevskiy, USSR Academy of Medical Sciences, Moscow]

[Text] Experimental therapeutic trials were conducted on the efficacy of a combination of electroanesthesia and dalargin as a liver-sparing modality in hepatic pathology. The experiments were conducted with 180-200 g male rats that had undergone surgery for acute cholestasis and pancreatitis. The various treatment combinations included electroanesthesia + diazepam, dalargin (10^{-9} moles/100 gm; i.p.), and electroanesthesia + diazepam + dalargin. The results were monitored in terms of serum levels of 5'-nucleotidase, histidase (EC 4.3.1.3), and urokinase (EC 4.2.1.49), which reflected the extent of liver damage. The results showed that dalargin alone was effective in lowering serum levels of the three enzymes in question, thereby minimizing liver damage. However, the effectiveness of dalargin were evident for only 5 h; after 24 h there was no enzymatic evidence of a liver-sparing effect. The employment of electroanesthesia (5 h) in combination with the sedative and dalargin provided protection for 72 h as a result of greater stability of the hepatic plasma membranes. These observations suggest that the optimal system of anesthesia in surgical hepatic conditions would encompass electroanesthesia (because of impaired hepatic metabolism of drugs) in combination with dalargin. The electroanesthesia mediates, at least partially, endogenous opioids involved in tissue repair. Figures 3; references 9: 5 Russian, 4 Western.

UDC 616.8-009.24-092.9-02:615.213]-07

Effects of Delta Sleep Peptide (DSP) on Convulsions During Corazole Kindling

18400248c Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 106 No 9, Sep 88 (manuscript received 19 Jun 87) pp 269-271

[Article by A. A. Shandra, L. S. Godlevskiy, G. N. Kryzhanovskiy, R. F. Makulkin, I. I. Mikhaleva and V. T. Ivanov, Chair of Pathological Physiology, Odessa Medical Institute imeni Pirogov; Laboratory of General Pathology of the Nervous System, Institute of General Pathology and Pathologic Physiology, USSR Academy of Medical Sciences; Laboratory of Peptide Chemistry, Institute of Bioorganic Chemistry imeni M. M. Shemyakin, Moscow]

[Abstract] An analysis was conducted on the effects of DSP on the course of convulsive responses in animals subjected to Corazole kindling, in order to expand the knowledge base on the antiepileptic effects of DSP. Mice (CBS x C57B1/6)F_1 and Wistar rats were treated with Corazole in subconvulsive doses for 3 weeks (30 mg/kg/day; i.p.), combined with EEG monitoring. DSP effects were evaluated following intraperitoneal administration of 100 μg/kg DSP. Testing with Corazole 5 min to 24 h after DSP administration showed that maximum inhibition of convulsive episodes (by 50 percent)

occurred within 0.5-1 h, with the latent period for the convulsive response prolonged by 30-40 percent. The effects of DSP persisted for 24 h. Intraperitoneal injection of naloxone (2.5 mg/kg) did not affect the results of DSP administration. DSP was thus shown to be effective both in epileptic attacks and in generalized convulsions due to Corazole. Furthermore, it is also noteworthy that the effects of DSP are evident with doses (10 nmoles/kg) that are far lower than those seen with phenobarbital (about 10 mmoles/kg). Figures 3; references 7: 4 Russian, 3 Western.

UDC 615.356:577.161.3].015.2.615.281.8.547.283.2].015.4

Combination of Low Doses of Vitamin E and Dimethyl Sulfoxide in Stress Management

18400248d Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII MEDITSINY in Russian Vol 106 No 9, Sep 88 (manuscript received 12 Jun 87) pp 274-277

[Article by I. P. Levshina, A. B. Obidin and N. V. Gulyayeva, Laboratory of Experimental Pathology and Therapy of the Higher Nervous System, Institute of Higher Nervous Activity and Neurophysiology, USSR Academy of Sciences, Moscow]

[Abstract] Since lipid peroxidation is one of the key pathogenetic mechanisms underlying stress, outbred rats were employed in assessing the therapeutic effects of a combination of vitamin E and dimethyl sulfoxide (DMS)—a combination of a free-radical scavenger and an agent enhancing membrane permeability—in biochemical and behavioral terms. Stress was induced by subjecting the animals to electric shock treatments and white noise for 3 weeks. Prior to a stressful episode the animals were treated per os with 5 mg/kg vitamin E and 50 mg/kg DMS, as a combination and individually, in various control experiments. The combination of vitamin E and DMS prevented both stress-induced hyperactivity and hypertension and maintained a normal Hildebrandt index. Used separately, these agents were either ineffective or possessed very low efficacy. Administration of the combined agents depressed the level of products resulting from lipid peroxidation in the brain and the serum samples, cholesterol levels, and the cholesteral/phospholipid ratio in the brain. Concomitantly, brain activity of superoxide dismutase was significantly elevated, as was nonenzymatic superoxide scavenging activity of the serum. These findings suggest that the combination of vitamin E and DMS is highly effective in minimizing lipid peroxidation, offering the added advantage of very low toxicity of both agents. Figures 2; references 15: 10 Russian, 5 Western.

UDC 612.8.015:612.815.1

Effect of Osteoreceptive Signalling on Neuromediator Content in Brain Structures

18400275 Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR in Russian No 1, Jan 89 (manuscript received 20 Jul 88) pp 124-126

[Article by G. K. Praulit, V. Ye. Klusha, R. K. Mutseniyetse, I. R. Liyepa, Latvian Order of the Red Banner of Labor State University im p. Stuchka; Order of the Red Banner of Labor Institute of Organic Synthesis, LaSSR Academy of Sciences]

[Abstract] With the central mechanisms and participation of various neuromediators and their modulators in osteoreflex effects unclear, the researchers performed a biochemical study of neuromediators of noradrenaline, dopamine, serotonin, and γ-aminobutyric acid (GABA) in the striate body, the hypothalamus, and the medulla oblongata in outbred albino rats exposed to osteostimulation. After the osteostimulation (intraosteal injection of 0.2 ml isotonic solution in the osteoreceptive zone of the tibia, five times over the course of two weeks), a significant reduction in GABA content was observed in the hypothalamus, with a slight reduction in the striate body. The striate body also showed reduced levels of serotonin (which were not observed in the hypothalamus or the medulla oblongata). The researchers conclude that acting on the osteoreceptive zones has an affect on the neurochemical indices of the brain, chiefly in the hypothalamus; they found the GABA-ergic system of the brain to be the most responsive system. Figures 2, references 8: 7 Russian, 1 Western.

UDC 612.8+591.51

Long-Term Change in Emotional Status and Trainability of Albino Rats Following Immunization with a Conjugate of Sidnophene with BSA

18400277b Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 303 No 6, Dec 88 (manuscript received 15 Sep 88) pp 1512-1514

[Article by R. A. Danilov, M. F. Obukhova, USSR Academy of Medical Sciences Member I. P. Ashmarin, and USSR Academy of Medical Sciences Member M. D. Mashkovskiy, Moscow State University imeni M. V. Lomonosov; Institute of Normal Physiology imeni P. K. Anokhin, USSR Academy of Medical Sciences, Moscow; All Union Scientific Research Chemicopharmaceutical Institute imeni Sergo Ordzhonikidze, Moscow]

[Abstract] The effect of immunization with covalent conjugates of the psychostimulator and antidepressant sidnophene with BSA on emotional status and formation of conditioned-reflex behavior was studied in albino rats, especially within the context of the possibility of producing a long-term effect. A number of changes were noted in the behavior of the animals—poor orientation, immobility, torpor. They were fearful, and motor activity was often impulsive. Signs of autonomic stimulation (defecation and urination) accompanied the behavior. Positive changes in learning ability began to show up a week after the final immunization, reaching a peak after 2-4 weeks and lasting 1.5-2 months. Immunization with the conjugate produced a long-term change in emotional state similar in certain ways to the change brought about by neuroleptics. Figures 2, references 4 (Russian).

UDC 615/38/.39/(47.922)

Improving the Blood Service in the GSSR

18400036a Moscow GEMATOLOGIYA I TRANSFUZIOLOGIYA in Russian
Vol 33 No 5, May 88 (manuscript received 10 April 87) pp 57-59

[Article by Prof. I. Sh. Zedginidze, R. I. Kravishvili, V. T. Chkhaidze, and I. B. Muradova, Georgian Scientific Research Institute of Hematology and Blood Transfusion, Tbilisi]

[Text] The blood service in the GSSR is a broad organizational system which includes the Scientific Research Institute of Hematology and Blood Transfusion, the Republic Blood Transfusion Center, and other blood transfusion centers and departments.

Over the last five years, definite achievements have been noted in the organization and development of the GSSR blood service. Theoretical and applied science conferences of blood service workers, seminars, and extension sessions in different regions have been held systematically for the purpose of offering skilled service at different places and analyzing the results of the activity of blood service institutions. New methods and forms of work have been adopted at blood service institutions. Procedure recommendations developed by the institute are periodically sent to treatment and prevention institutions. A new form of training treating physicians in transfusion work has been established. Urgent problems that are being examined annually by the GSSR Ministry of Health staff, such as those involving donations and transfusions, have been studied systematically; to solve them, specific measures have been determined which are directed at improving the activity of the blood service. Special attention has been devoted to the development of a network of blood service institutions, chiefly in terms of the blood transfusion centers and departments; the number of these subdivisions has increased by 12 percent. The expansion of the network of departments has fostered the broad involvement of relatives and close friends of patients as unpaid donors, and this has made possible a considerable increase in the volume of blood procured charge-free—58 percent of all free blood in the republic is procured in these blood transfusion centers and departments.

In recent years, information on blood donation has been disseminated in the mass media; radio, television, and the republic and local press have been used to better advantage. Grand meetings of recipients and donors are organized. The blood service institutions conduct skilled drives for donations. Regional newspapers systematically publish articles about donorship and information about hemotherapeutics; speeches, discussions, lectures, and donor days are organized. The active participation of medical workers of the treatment and prevention institutions in this movement has furthered the drive for free donations. It should be noted that widespread enlistment of relatives and close friends of patients receiving treatment in a hospital to give blood has helped charge-free donorship to grow; the number of donors in this category in recent years has increased by a factor of 1.7 and constitutes 41 percent of the total number of free donations.

In recent years, the republic has developed new kinds of donorship for the purpose of obtaining various blood preparations, including immune blood cells: the donation of plasma, immune plasma, and rare blood groups. At the present time, not only has the supply of stored blood and its components and preparations at medical institutions been improved considerably, but treatment of many illnesses has become possible—staphylococcus infection, for example, is treated by means of antistaphylococcus plasma and antistaphylococcus immunoglobulin, and hemorrhaging in hemophilia is treated by means of cryoprecipitate.

A great amount of work has been done in the study of the sound use of stored blood and its components and preparations in the medical institutions of the republic. It has been established that in a number of medical institutions, whole blood has been used inefficiently for medical purposes. Cases have been identified in which treating physicians have been inclined to give multiple blood transfusions without the appropriate indications, while for most patients it would be more advisable to transfuse the erythrocyte fraction or some other blood component. After analyzing the data, we identified two characteristics of such an approach; first, a number of physicians, although they understand the desirability of transfusing red blood cells or some other component, transfuse whole blood because there are no means in the region for separating blood into components; in the second place, some physicians disregard the erythrocyte fraction and prefer whole blood instead, and, holding to obsolete transfusion tactics, frequently consider it the only effective means.

To eliminate these deficiencies in the blood service system and in the medical institutions of the republic, restructuring of their activity was required, with the introduction of modern forms and methods of work and the training of personnel with a new short program developed by the institute.

As the result of the scientific-organizational and methodological measures taken, significant progress has been observed in recent years in the optimal and efficient use of stored blood. Accordingly, if for transfusions the rayon hospitals in 1982 used, on average, 67 percent of stored blood taken from the total amount collected, that figure today has been reduced to 40 percent, and the rest is processed at the Republic Blood Transfusion Center. It is obvious from the data cited that treating physicians are approaching transfusion therapy techniques with more skill and have begun to limit whole blood transfusions, using components, preparations, and blood substitutes more widely.

The sound use of stored blood has made it possible to increase the blood resources used for producing its preparations and components. The republic has increased their production from year to year. In the last 5 years dry plasma production has increased by a factor of 1.2, cryoprecipitate production by 1.3, fibrinogen production by 1.4, and antistaphylococcal plasma production by 1.5, while the production of a highly efficacious preparation of complex action such as albumin (10 percent solution) has increased by a factor of 7.5.

In spite of definite achievements, a number of unresolved problems remain which inhibit intensive development of the blood and transfusion service. Free donations have not reached the proper level, the equipment and material-technical base of the blood service do not meet present-day needs, and personnel turnover hinders the manning blood service institutions.

In order to accelerate the provision of the medical institutions of the republic with effective preparations and components of donated blood, the 12th Five-Year Plan in the GSSR calls for the development of a new material-production base—the building of facilities for protein fractionation at separate republic blood transfusion centers, the adoption of the plasmapheresis method, the expansion of the network of blood transfusion centers and departments with provisions for separation of donated blood into components (plasma and blood cell fractions), and the efficient use of stored blood at medical institutions.

UDC 615.38:008(474.5)

Restructuring the Work of the LiSSR Blood Service

18400036b Moscow GEMATOLOGIYA I TRANSFUZIOLOGIYA in Russian
Vol 33 No 5, May 88

[Article by A. P. Bartkyavichyus, S. V. Butova, P. P. Rimkus, and Yu. P Senkyavichyus]

[Text] At the present time, Latvia has developed a wide network of blood service institutions which make it possible to completely satisfy the needs of treatment and prevention institutions for blood, its components, and certain preparations, as well as immunoglobulins with specific activity and hemostatic preparations. About 10 percent of the stored donor blood is used for transfusion to patients. However, further expansion of the medical network, the improvement of the specialized medical service, and wide adoption of component therapy methods require the redesign of blood service operations. Problems associated with the efficiency of operation of blood service institutions, reduction of the production cost of blood preparations, and the practicability and scientific validity of plans for storing donated blood and plasma have become urgent. Expansion and strengthening of the material and technical base of the blood service of the republic is required.

At the present time, blood preparations are produced only at the Republic Blood Transfusion Center. It is planned to have production of individual blood preparations (amino blood fraction [aminokrovin], protein, and immunoglobulins) based at the Kaunas and Klaipeda blood transfusion centers. Production technology can be brought up to the modern level and the product assortment and yield of blood components and preparations can be increased only by providing facilities with modern, highly efficient equipment.

The solution to the problem of erythrocyte use is also awaited. At this very moment, the discrepancy between the amount of prepared blood and the demands for whole blood and its cellular components is generating a problem in erythrocyte use.

Latvia's planned production of amino blood fractions and the establishment of long-term storage banks for the cellular fraction of donated blood can only partially solve the problem of erythrocyte use. The principal means being proposed to solve the problem is the widespread adoption of plasmapheresis not only among regular donors, but also among reserve donors; however, the necessary minimal number of centrifuges, plasticized [plastikatnaya] apparatus (hemacones and component filters [gemakony i kompoplasty]), and other equipment are still lacking.

A method of binary [dvoynoy] plasmapheresis has been adopted at the Republic and Kaunas blood transfusion centers. Four blood transfusion centers and two blood transfusion departments prepare immune plasma for the patients of the republic. Experience shows that it is completely practicable to prepare by the plasmapheresis method not only immune plasma but also plasma for production purposes. It is necessary to reequip regional gravitational blood surgery centers with modern fractionators and a sufficient number of trunk systems to them and also other plasticized apparatus.

To raise the level of knowledge about problems associated with clinical transfusions and the management of the blood service, the republic conducts lessons for the students in the department for advanced training of physicians at Vilnius University, with more than 3,500 physicians of different specialties having attended since 1981. Lectures on practical transfusion technics are delivered annually to sixth-year students of the therapeutics and pediatric divisions of the medical department of Vilnius University. In addition, extension seminars are held for physicians of the treatment and prevention network in the cities and rayons of the republic.

The result of this work is a reduction in the use of whole blood, a rise in the demand for blood components and preparations, and a rise in the competency of physicians with respect to the science of transfusion and hemostasis.

Practice has shown that transfusion service is better managed in those medical institutions in which a blood transfusion department has been established and is in operation. Therefore, setting up blood transfusion departments at all central rayon hospitals of the republic is a priority. Large blood transfusion departments at clinical hospitals must have the capability of preparing immune plasma, producing antihemophilic plasma and cryoprecipitate and conducting plasmacytophoresis; they must possess a procedure for rapid diagnosis of hemostasis disturbances and have the capacity to help those in thrombohemorrhagic states. It is absolutely wrong to limit the scope of duties of the blood transfusion department physician to merely the preparation of blood or the transport of blood from blood transfusion centers. The blood service physician is a transfusionist who is skilled in the procedure for removing patients from critical states by means of infusion-transfusion therapy, one who works side by side with the anesthesiologist-resuscitationist, the surgeon, and the obstetrician-gynecologist. The work of the Republic Blood Transfusion Center is set up in this vein—a procedures center for work with practicing physicians who are responsible for blood transfusion at medical institutions.

Republic and area consulting transfusion centers with hemostasis service must be established. Blood transfusion departments, with gravitational blood surgery center, could serve as the primary base for them. At the same time, the Republic Blood Transfusion Center remains the procedures center. The removal of physicians of the blood transfusion center and blood transfusion department, who often are former highly skilled clinicians, from clinical practice is wrong.

A course that continues to attract nonproduction workers and students as donors and increases the average single blood donation to 400 ml (the average was 333 ml for the republic in 1986) is economically valid.

UDC 616-082-03957(479.24-22)

Construction of a Network of Dispensaries in Rural AzSSR Settlements

18400163 Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 8, Aug 88 (manuscript received 26 May 87) pp 6-7

[Article by F. B. Agayev, O. S. Abdullayev, G. U. Olizarova, and S. B. Garayeva, Azerbaijan Institute for Advanced Training of Physicians imeni A. Aliyev of the USSR Ministry of Health Under the "Public Health Administration" rubric: "Construction of a Network of Dispensaries and Their Location in Rural AzSSR Settlements"]

[Text] The optimization of the construction of a network and the territorial location of dispensaries plays an important role in raising the quality and improving the accessibility of outpatient dispensary care to rural inhabitants[2,3]. At the present time, a method for long-term development and location of a network of treatment and prevention institutions[4] has been developed; according to this method, a number of studies taking into consideration their social- economic and natural-climatic conditions have been made on different territories. The AzSSR has specific characteristics. There are nine types of climates in the comparatively small territory of the republic; the rayons are divided into 12 groups according to agricultural specialization[1]. In connection with this, the scientific basis for constructing a network and locating dispensaries in agricultural settlements of the AzSSR is an important practical task.

A study has been conducted in the Agdash rayon, which has the most characteristic type of climate for the republic. This rayon is semidesert and dry steppes with mild winters and dry hot summers. THe basic tasks of the work were the conducting of a structural- functional analysis, an evaluation of the historically complex network of dispensaries in agricultural settlements, the elucidation of demographic and medical-organizational factors affecting the development and location of a network of dispensaries, and the development of indicators of the need of the population for different kinds of medical care (for therapy, pediatrics, obstetrics and gynecology, surgery, and dentistry).

It should be noted that in the Agdash rayon, there are 72 agricultural settlements which have no physicians at their public health institutions. At the end of 1985 the population was distributed in this way: 9 settlements with less than 300 inhabitants; 25, with 300-700 inhabitants; 3, with 700-900 inhabitants; 13, from 900 to 1300 inhabitants; 9, from 1300 to 1800 inhabitants; 1, from 1800 to 2400 inhabitants; and 2, from 2400 to 3500 inhabitants. Twenty-eight settlements have feldsher-midwife centers, and their minimal distance from dispensaries or district hospitals basically exceeds 2 km. These rural settlements are served by 10 dispensaries and district hospitals for rendering out- patient dispensary care at the local settlement level. The maximal service radius of these institutions comprises 14 km (up to 30 minutes by transport), and only two rural settlements are located at a distance greater than 10 km from dispensaries. For 58.1 percent of noncenter villages, in which 74.9 percent of the population of the primary settlement system lives, the distance from the dispensary does not exceed 5 km. The maximal service radius within the rayon comprises 42 km. The maximal distance from the rayon center of 58.4 percent of rural settlements, in which 73.3 percent of all inhabitants of the periphery live, is less than 20 km. Consequently, rural settlements basically are compactly located, and this must be considered as a favorable condition for organizing step-wise medical service. The location of dispensaries and district hospitals existing at the present time does not enable their capacity to be expanded. A definite disproportion is observed between the number

of the population served by public health institutions for out-patient dispensary care and their actual staffing by physicians. Therefore, in order to plan the optimal level for satisfying the need of the population, the necessary number of physicians for each of the specialties enumerated above was calculated for providing out-patient dispensary care on a local level (See Table). A physician position for a specific specialty was considered necessary when the value of the calculated indicator was greater than 0.87 physician position (the allowable value for rounding up to 1).

Number of Medical Positions Necessary to Provide Out-Patient Dispensary Care at the Local Level

Center of Local Settlement System	Medical Specialty					Institutional Capacity (Number of Visits Per Shift)
	District Therapists	District Pediatrics	Dentistry	Obstetrics-Gynecology	Surgery	
Arabadzhag	1.00	1.00	2.50	—	—	40
Shykhly	2.50	2.25	5.00	1.00	—	106
Lyaki	3.00	4.25	6.75	1.00	1.00	162
Kyukel	3.00	3.00	5.00	1.00	—	140
V. Kolgaty	1.25	1.00	2.50	—	—	45
Piraza	1.25	1.50	3.00	—	—	50
Karadein	1.00	1.00	2.25	—	—	40
Nizhniye Lyaki	1.50	1.50	3.00	—	—	55
Dzhardam	1.00	1.00	2.00	—	—	35
N. Nematabad	1.00	1.50	2.50	—	—	45

The dispensary (out-patient) capacity was calculated taking into account the physician positions stipulated for providing out- patient care at the local level. The value of the dispensary shiftwork coefficient was established at 1.66.

The data on the territorial location of population centers, the distance between them, the characteristics of the Agdash rayon, the location of the rayon center, and the presence of a larger settlement (Lyaki) make it possible to substantiate an organizational decision which is important for improving out- patient dispensary care both at the local and the rayon level. It is recommended in the future to abolish the Nizhne-Lyaki dispensary and to strengthen the out-patient service of the Lyaki settlement hospital. Here, its capacity comprises 220 visits per shift, and the maximal service radius is less than 10 km.

Thus, the building of new types of dispensaries with consideration of scientifically based capacities and recommendations for their location must be the chief direction for the radical improvement of out-patient dispensary care of the rural population at the local level.

Footnotes

1. "Atlas Azerbaidzhanskoy SSR" [Atlas of the AzSSR], Aliyev, G. A., Aliyev, Sh. D., Dimirgayayev, Sh. K., et al., Moscow, 1979.

2. Malov, N. I. and Churakov, V. I., "Sovremennyye osnovy i metody planirovaniya razvitiya zdravookhraneniya" [Modern Bases and Methods for Planning the Development of Public Health], Moscow, 1984.

3. "Metodika provedeniya issledovaniya po nauchnomy obosnovaniyu razvitiya seti ambulatorno-poliklinicheskikh i statsionarnykh uchrezhdeniy v perspektivnykh sistemakh rasseleniya" [Method for Conducting Research on the Scientific Basis for Developing a Network of Out-Patient Dispensary and Permanent Institutions in Long-Range Location Systems]/Loginova, Ye. A., Gavrilov, N. I., Potekhina, M. V., et al., Moscow, 1982.

4. "Metodicheskiye ukazaniya po razrabotke nauchno-obosnovannykh skhem perspektivanogo razvitiya i razmeshcheniya seti lechetno-profilakticheskikh i aptechnykh uchrezhdeniy" [Procedural Instructions for the Development of Scientifically Based Systems for Long-Range Development and Location of a Network of Prevention and Treatment and also Pharmaceutical Institutions], Moscow, 1982.

UDC 616-074:061.6

Laboratory Diagnosis in Modern Medicine and Health Care: Optimizing Methodology When Creating Diagnostic Centers

18400205 Moscow LABORATORNOYE DELO in Russian No 10, Oct 88 pp 3-9

[Excerpts from an article by V. V. Menshikov, No 1 Moscow Medical Institute imeni I. M. Sechenov, under the "Progressive" rubric]

[Excerpts] The revolutionary process of restructuring, which currently encompasses all aspects of the country's economic and social life, is also unfolding in the health

care system. We have openly and sharply criticized the state of our health care. This has been done at the highest state level. In their "Basic Guidelines for the Development of Public Health Protection and the Restructuring of Health Care in the USSR in the 12th Five-Year-Plan and in the Period up to the Year 2000," the CPSU Central Committee and USSR Council of Ministers have stipulated the task of radically restructuring health care, eliminating its shortcomings, ensuring that the existing potential is used effectively, and sharply increasing the quality of medical care. Many of the goals that have been set have already been brought to life by government decrees and by orders of the USSR Ministry of Health. The leaders of the party and local Soviet organs have actively focused their attention on the state of health care institutions. The pace at which health care facilities are being constructed and the amounts of capital investments in them have increased significantly. Various restrictions related to the independence of the directors of health care organs and institutions have been abolished.

New forms of organizing the work of medical personnel—using team labor, for example, or having general practitioners serve the public, or implementing cost-accounting in the operation of medical institutions—are actively being sought and are being experimentally verified. The first diagnostic centers have been created in various regions of the country.

However, these are only the first steps in restructuring health care. Many serious flaws in the activity of medical institutions have not yet been corrected, and the public's needs for medical care are not always fully or quickly satisfied. The efficiency of the medical service at a number of institutions is still poor. The preventive aspect of health care is not being universally implemented. Positive trends in the morbidity indicators are still not very distinct.

Now that the 19th All-Union Party Conference has so deeply and comprehensively examined the restructuring processes that are under way in the country and has created an atmosphere in which their further development is ensured, our medical sector must also provide a strong impetus for forward motion.

The All-Union Physicians' Conference (Moscow, October 1988) was called upon to provide such an impetus and to rouse wide circles of medical personnel to the creative search for ways of fully implementing the health care system's internal potential.

As a part of medical science and practice, a diagnostic laboratory cannot be isolated from the state of health care and medical science throughout the country. It can only develop as a part of the health care system, working closely with the specific organizational forms of treatment-and-prevention institutions. From year to year, all of us together—scholars, practitioners, and health care organizers—have tried to expand the institutional network and increase laboratories' capabilities. And widely acknowledged results have been achieved. In the past 15 years—from 1970 to 1985—the number of health care institutions with clinical and diagnostic laboratories has increased by 3,100, reaching 27,830. The total number of analyses performed in laboratories has increased 2.7-fold, amounting to 3,608,000,000 in 1985. In 1970, we performed 5.5 laboratory diagnostic studies per inhabitant of the country versus 13 in 1985, i.e., the number increased 2.4-fold.

How should these figures be viewed? On the one hand, they confirm the rather stable growth in treatment institutions and, consequently, in the number of laboratory diagnostic studies provided to the public. On the other hand, at the current stage in the development of our economy and our health care system, we cannot be satisfied with simply a quantitative increase or with the extensive nature of the development of laboratory service. What paths of restructuring must our laboratory work take so as to most fully meet modern requirements and to be capable of making great strides forward tomorrow?

The restructuring of health care aims at creating highly effective mechanisms for organizing the prophylactic and treatment-and-diagnostic work of medical institutions. It appears that this can be done by creating conditions in which each medical worker at a medical institution will take an interest in the end result of his activity. And that result amounts to raising the level of the health of the people being served. It is not easy to find a simple correlation between the quantity and quality of the labor of each medical worker and the end result of an institution's activity in the complicated structure of the processes entailed in ensuring public health.

But this must be done in order to fully use the capabilities afforded by using an economic management mechanism in health care. It is clear to everyone that, with the entire national economy and the nonproduction sector switching to a cost-accounting track, economic enhancement levers must also be sought in laboratory work. If the object of the laboratory workers' labor is addressed, then, it would seem, it will be easy to give an economic assessment of this labor by calculating the consumption of reagents, electrical power, and water; the depreciation of equipment; and the labor intensity of laboratory research.

All labor collectives must work more economically, i.e., they must perform the required amount of work with the least effort, the highest labor productivity, and the least expenditure of resources (including reagents, electrical power, and water). No matter how small the crumbs saved in small laboratories, they can produce a hefty result when multiplied by hundreds of days. And the

monetary equivalent of this savings can, with cost-accounting, be directed toward the collective's social development and toward material incentives for workers.

How can laboratories' operation be enhanced? One way is entirely in our hands, i.e., the scientific organization of labor and a high level of labor discipline. This path is not new, but its possibilities have been far from fully or universally realized. A high level of professionalism is manifested, above all, in conscientious, precise, economical, and efficient labor. No one can introduce this into the laboratory from outside.

An important condition for enhancing laboratory diagnostic work involves eliminating the substantial gap between the extensively developed network of diagnostic and clinical laboratories and the rest of the material and technical base of these institutions and overcoming the weakness of domestic laboratory instrument making, whose products are currently inferior to the modern instruments available on the international market and, above all, to the equipment that is being developed at scientific institutions. This gap is rather large. Attempts are currently being made to close this gap with measures that have been prepared by the USSR Ministry of Health, including those measures related to implementing the "Basic Guidelines for the Development of Public Health Protection and the Restructuring of Health Care in the USSR in the 12th Five-Year-Plan and in the Period up to the Year 2000."

The measures include top-priority measures to develop medical technology, and in implementing those measures, we expect to elevate laboratory instrument making.

Modern laboratory technology requires highly technical thinking and good production efficiency, as well as the mandatory use of microprocessors or microcomputers. Its genuine creation is possible only if a progressive design team is combined with a strong production base.

Evidently, the most promising results may be obtained when other departments and organizations work on laboratory technology together with the Medlabtekhnika Scientific Production Association (Leningrad) of the USSR Ministry of Instrument Making, Automation Equipment, and Control Systems. In the past few years, for example, laboratories have begun to produce more and more KFK-2 and KFK-2MP (ZOMZ) photometers. The results provided by the Eksan-1 glucose analyzer (Biochemistry Institute, Lithuanian SSR Academy of Sciences) have not been bad. The results of tests of the Glyukofot device with Glyukozan diagnostic strips (Physical Chemistry Institute, UkSSR Academy of Sciences, and Kiev Endocrinology and Metabolism Scientific Research Institute, UkSSR Ministry of Health) have definitely been satisfying. Vigorous work is under way at the institutions of the Ministry of the Medical and Microbiological Industry on a system for enzyme immunoassay.

Unfortunately, the centrifugal biochemical analyzer that is enticing from the standpoint of its design and that was jointly developed with the firm Lobotron (FRG) has not yet entered series production. However, there has still not been any decisive progress, and the development and production of new equipment is extremely urgent. Top-priority is being given to the development of the integrated, special program "Equipment and Methods for Laboratory Diagnosis and Laboratory Monitoring of Treatment." The No 1 Moscow Medical Institute imeni I. M. Sechenov, the All-Union Medical Technology Scientific Research and Experimental Institute of the USSR Ministry of Health, the Central Republicwide Clinical Hospital of the RSFSR Ministry of Health, and the Military Medical Academy imeni S. M. Kirov have been designated as the head organizations for establishing the program and coordinating the development of the equipment and methods. Seven industrial ministries, together with the USSR and RSFSR ministries of health, have been charged with developing the program. The specialization of these ministries with regard to developing, producing, and delivering laboratory technology has been specified, and the production volume quotas have been set.

Over the past 15 years, modern diagnostic work has been enriched by a number of very informative pieces of hardware based on different principles of visualizing injury to organs. These include endoscopes that use fiber optics and that are equipped with video cameras and powerful illuminating devices, including lasers. Endoscopes permit careful examinations of virtually all of the body's cavities, and even the taking of a tissue sample from a section of tissue, something that has caught the attention of researchers. Ultrasound echo ranging affords very extensive capabilities for studying the structure and functioning of the internal organs. Finally, we will mention so powerful a method of searching for pathology as computer tomography, including NMR tomography.

Including these pieces of hardware in the diagnostics arsenal makes it possible to bring diagnostics to a completely new level of capabilities from the standpoint of speed and precision in detecting and localizing pathology. The appearance of these devices creates a new "balance of power" between structural and laboratory diagnostics. This technology is being used successfully at many institutions; however, it is still not being used widely enough.

Endoscopes, ultrasonograms, and computer tomographs are included in the aforementioned measures to develop medical technology. But the process of the creation of medical technology is a protracted one, and it is difficult to anticipate any significant progress that would be

noticeable at rank-and-file institutions prior to 1993-1995. Under these conditions, implementation of the idea of creating consultation-diagnostic centers is a measure for moving to the modern level of diagnostics relatively rapidly. These centers represent a form of organizing the diagnostic process that is new for our health care system. It is geared toward making more effective and efficient use of existing instruments and qualified personnel.

Every consultation-diagnostic center must have diverse diagnostic equipment that makes it possible to investigate and detect both structural and functional deviations from the norm in the body of the individual being examined. The equipment of these centers must include x-ray equipment, computer tomographs, equipment for ultrasound diagnosis, endoscopic instruments, electrocardiographs, and equipment for functional diagnosis of the condition of the lungs. Besides these, the consultation-diagnostic centers must have a laboratory subdepartment equipped with biochemical analyzers, microscopes, and other common laboratory equipment.

In view of the fact that our medical instrument making industry is lagging, these consultation-diagnostic centers must be equipped with hardware that has been produced abroad. The use of this equipment should, of course, be organized effectively, with the equipment employed on at least two shifts. It is suggested that between 600 and 800 patients may pass through a consultation-diagnostic center per day. From the description of consultation-diagnostic centers, these institutions are, evidently, comprehensive institutions integrating the newest capabilities of the different branches of diagnostics.

A center's staff will include experimental consulting physicians whose task will be to synthesize the information obtained through diagnostic studies and to give advice to the physicians who treat the patients examined at the centers. Obtaining precise, objective information about the structural and functional changes in the human body, particularly comprehensive information, becomes a decisive factor not only for the diagnostic process, but also for all of the activities of the medical institutions from the standpoint of their ultimate goal—that the treatment be effective.

Development and consolidation of the specialized types of medical care represent an important condition for further improving the quality of medical care. It has been proposed that a network of all-union, republicwide, and interoblast (regional) centers be created to accomplish this. These centers would include microsurgery, organ and tissue transplantation, and cardiovascular surgery departments and branches as well as departments and branches to treat patients with chronic renal insufficiency and other diseases.

Thus, modern approaches to organizing the medical care provided to the public assume the presence of several stages of care: the family physician → the consultation-diagnostic center → the specialized treatment center. Each of these stages would include a unique combination of specialization and integration of the diagnostic information obtained.

The creation of consultation-diagnostic centers—and the number of such centers in the country will increase—is intertwined with the problem of centralizing laboratory research. We have vigorously stimulated this process, and now the analyses of 1.4 percent of all clinical-and-diagnostic laboratories, 13.6 percent of all biochemical laboratories, 15.8 percent of all bacteriologic laboratories, 27.0 percent of all serologic laboratories, and 38.4 percent of all cytologic laboratories are performed centrally. It seems expedient to establish close ties between consultation-diagnostic centers and a centralized clinical-and-diagnostic laboratory or, under certain conditions, even to merge them—particularly in places where the organizational, economic, and personnel prerequisites for this exist.

In light of the role of laboratory diagnostics under the new conditions and the indispensable part that laboratory workers play in the activity of consultation-diagnostic centers and in specialized treatment centers, the following may be termed key issues: the size and content of the laboratory diagnostic program when the laboratory interacts with other subdepartments, and the forms in which all types of diagnostic activity can be integrated.

Resolving these issues requires a dialectic approach. On the one hand, a consultation-diagnostic center can produce a level of laboratory information that is difficult to produce in rank-and-file laboratories. The technical capabilities of consultation-diagnostic centers are, from the outset, higher than those of polyclinic laboratories, from the standpoint both of their range of accessible methods and their complexity.

On the other hand, considering the centers' high capabilities with respect to many diagnostic departments, they can be expected to confine themselves to strictly designated types of laboratory studies (expensive and complicated, albeit the most informative), owing to their concentration and comparison as well as to the experience brought by their highly skilled specialists.

Using the most effective laboratory tests that yield the most precise information possible about the essence of human pathology is an important direction in the enhancement of the laboratories' activities. Selecting such informative tests will make it possible to reduce to total amount of laboratory work by "weeding out" studies that are less reliable from a diagnostic standpoint. It should, however, be realized that using the more effective tests offered by science often entails significant difficulties: the mastering of new methods and the development and production of new instruments and reagents

that did not previously exist. It is sometimes psychologically difficult to discard an old customary method in favor of a new test that might be better, but has not yet become familiar. Often, the new method is initially more expensive than the old one; however, the general trend toward using more precise methods gradually makes procedures less expensive and more precise, thanks to their use of off-the-shelf analytical forms and automated laboratory instruments.

One cannot but see the substantial reserves that lie in the improvement of the tactics for using laboratory studies for purposes of clinical diagnosis. This applies to the efficient distribution of the performance of laboratory tests among different links of the laboratory service, using tests in a specified logical order (in the form of a diagnostic algorithm) and improving the interpretation of laboratory test results as a result of having data from other diagnostic studies.

Comparing laboratory indicators with other types of studies and subsequently evaluating the diagnostic effectiveness of laboratory tests makes it possible to objectivize the selection of the tests that are most informative. It appears that, when preparations are being made to open a consultation-diagnostic center, it is necessary to significantly accelerate the development both of different types of optimized diagnostic laboratory programs and integrated diagnostic programs. The All-Union Scientific Methodological and Testing Center for Laboratory Work is currently working jointly with leading clinicians and laboratory diagnostics specialists to create step-by-step diagnostic programs based on the entire arsenal of specialized scientific institutions. [passage omitted]

In returning to the problem of cost-accounting in the operation of clinical-and-diagnostic laboratories as a component part of a treatment-and-prevention institution, it should be emphasized that the effectiveness of laboratory work is judged not only on the basis of the economy of the in-lab processes, but also on the basis of the usefulness of the laboratory studies in, say, detecting deviations from the norm, establishing a diagnosis, or monitoring treatment.

The complexity of making an economic assessment of laboratories' operation lies in the fact that the results of laboratory studies are used not by the laboratory workers who perform the analyses, but by clinicians.

The speed with wh[illegible]ratory information is obtained, the correctn[illegible] interpretation, and the use of the information in establishing a diagnosis and conducting therapy in conjunction with the results of other types of studies play a role here. Even highly effective work by laboratory workers may turn out to be useless in the clinical stage. Thus, a system for internal cost-accounting among clinical departments, on the one hand, and among diagnostic services, on the other, is needed. Relationships between the polyclinics and consultation-diagnostic centers should evidently be organized in the same manner.

Precise estimates, not so much of the costs of individual types of services—in this case, laboratory services—as of their clinical effect (based on generally accepted criteria), should lie at the foundation of the proposed system. The analyses performed should be reimbursed in accordance with this scale, and streamlining work (while maintaining the precision of the studies' results) should lead to a savings that would give the laboratory its own profits. A great number of clinically effective studies performed on the basis of efficiently organized work would give the laboratory's collective a great reward. The emerging seductiveness of introducing inexpensive (but also less precise) methods will be regulated by the popularity of these methods among clinicians and by their diagnostic reliability. The proposed system should be carefully worked out and tested at a large institution with a wide range of clinical specialties and a sufficiently high-capacity laboratory.

Thus, to keep pace with the entire health care system along the paths of restructuring, the laboratory service should do the following: develop its own proposals for cost-accounting relationships with clinical subdepartments, based on a scale of the clinical effect of individual types of studies; create efficient programs on the basis of the contemporary capabilities of other clinical diagnosis departments; and organize a business relationship with clinicians and other diagnostic services within the context of the new forms of organizing medical care (such as the family physician, the diagnostic center, the specialized treatment center, the home hospital, and the day hospital).

Generalizing the experience that has already been gained in the course of experiments at treatment-and-prevention institutions in different regions of the country will be decisive in developing these proposals.

Sick Leave in the Production Sector

18400207 Moscow POLITICHESKOYE OBRAZOVANIYE in Russian No 17, 1988 pp 75-77

[Editorial by S. Belozerova, candidate of economic sciences, under the "In the Mirror of Statistics" rubric]

[Text]

USSR Goskomstat Reports:

Morbidity With Temporary Disability, by Individual Cause (per 100 workers)

	No. Cases		No. Days	
	1986	1987	1986	1987
Total	103.0	94.5	1,054	1,011
Including:				
—Due to illness	72.7	66.3	878	839
Of which:				
—Flu and colds	35.8	28.9	259	219
—Trauma	4.0	4.1	92	94
—Disease of circulatory system	5.2	5.3	88	88
—Disease of osteomuscular system	5.6	5.9	77	79
—Disease of gastrointestinal tract	3.1	3.1	56	55
—Complications of pregnancy and postnatal period	2.3	2.3	36	37
—To care for ill persons	28.2	26.1	166	162

Candidate of Economic Sciences S. Belozerova Comments

The effective social policy that was announced at the 27th CPSU congress as a priority direction in raising the level of the Soviet people's life includes improving the workers' health protection, which in turn includes reducing morbidity.

Under the current conditions of the development of production, this problem has ceased being solely a concern of medical personnel. Protecting health is a socioeconomic problem. It must therefore be addressed at all levels, above all in the production sector. Indeed, the status of workers' health is, on the one hand, largely determined by their working and living conditions and by the degree to which social problems are addressed. On the other hand, it has a very strong effect on the production process and on the development of the country's economy.

Speaking at the 19th All-Union CPSU Conference, Ye. I. Chazov, USSR Minister of Health, presented the following data: the economic losses resulting from one day of lost work averages 26 rubles. If we multiply that by the 4 million workers who miss work on any given day because of their own illness or because they have to care for someone else who is ill, we get an enormous sum of losses—100 million rubles per working day in the country! And if one considers the fact that in industry, for example, each worker is ill 11-12 days a year (and in construction and transport, the figure is even higher), then the size of the national income is reduced by billions of rubles each year.

Despite the fact that the morbidity level still remains high, a general trend in the economy may be noted toward a reduction in both the number of cases of missed work (from 103 to 94.5) and the amount of workdays missed (from 1,054 to 1,011) per 100 workers.

The reduction occurred primarily because of a reduction in overall morbidity—both with respect to the number of cases (from 72.7 to 66.3) and with respect to the number of days of missed work (from 878 to 839). The reduction in lost work time due to flu and colds has been particularly significant. Lost work time in 1987 was 40 days less than in 1986 and amounted to 219 days per 100 workers. The losses related to diseases of the circulatory organs (including diseases of the cardiovascular system), osteomuscular system, gastrointestinal diseases, and complications of pregnancy have remained at a constant level.

Lost work time due to trauma, albeit insignificant, has increased slightly. However, the severity coefficient for trauma has remained high. As in 1986, it amounts to 23 days. (The trauma severity coefficient indicates the average number of days of disability per one case of trauma and is determined by dividing the number of days by the number of cases.)

Of course, the data presented characterize the "average" indicators that have evolved with respect to the national economy. These indicators make no distinctions between the nature and content of work, between working conditions in the production sectors and those in the nonproduction sectors, or between highly mechanized, technically well-equipped enterprises and enterprises using old-type production processes. They do not consider the relationship between disease and the organization of the production process (the rhythm of an enterprise's operation, its mechanization level, the condition of its equipment, etc.).

For this reason, it is better to analyze morbidity at the branch level, in same-type production groups, or in related enterprises. The relationships existing between level of labor organization, production processes, and predominate types of diseases characteristic of a given type of labor will be more evident here.

In the national economy as a whole, for example, a worker is ill, on average, 10.1 days (1,011:100); whereas the figure is somewhat higher in industry, i.e., 11.6 days, and, at certain enterprises, absences from work over the course of a year may amount to between 5 and 17 days per worker. For example, at enterprises in the Ministry of the Electrical Engineering Industry that were monitored, the morbidity amounted to 13-14 days. The figure was 7 days at the Novolipetsk Metallurgical Combine imeni Yu. V. Andropov, and it was 9 days at the Novokramatorsk Machine Building Plant imeni V. I. Lenin. Consequently, it is necessary to determine why more persons fall ill at some enterprises than at others.

It must be borne in mind that cardiovascular diseases are the most closely related to working conditions. They decrease significantly if working conditions are improved and if the production process is normalized. And they generally increase if the production rhythm is disturbed. The increase in this group of diseases is related to an increase in the stress of work at the end of the month, quarter, or year. Thus, lost work time due to diseases belonging to this group generally begins to increase in the last ten days of each month, a direct consequence of overstressed work.

Moreover, cardiovascular diseases are a reaction of the human body to a worsening of production conditions. Thus, increasing the temperature in the workplace by 10° is accompanied by an additional 4.1 days in lost work time. When the noise level increases by 20%, work absences due to illness increase by 2.7 days. Myocardial dystrophy is diagnosed in 12.5% of workers in hot shops and in only 4.5% of those working in cold shops.

Nervous stress has a great impact on the occurrence of hypertension. In workers performing mental labor, this disease is encountered twice as often as in workers who do physical labor. In the past few years, however, this disease has become increasingly widespread among workers, particularly those involved in production processes with a high automation level, where the nature of the labor is linked to a large extent with emotional stress and with critical work at a control panel. In addition, cardiovascular diseases are encountered rather frequently under old production conditions. There they are connected with the stress of working on obsolete equipment and with the closeness of the production conditions entailed in operations.

The organization of the production process—especially the smoothness of operations associated with suppliers—exerts a great effect on the morbidity level. Interruptions in supplies of raw materials and other things results in a loss of working rhythm at an enterprise and in overtime work. This in turn leads to overfatigue and a weakening of the body's resistance to infectious diseases. Trauma also increases under these conditions. An interesting pattern is develops: the more work done at an enterprise on workers' days off, the more work time lost due to trauma and the higher and more persistent the trauma severity coefficient.

One additional group of diseases that is presented in the table should be mentioned—osteomuscular diseases, including radiculitis, osteochondrosis, and other specific diseases of the osteomuscular system and connective tissue. These diseases are most often encountered at enterprises with a low production efficiency, where manual labor is widely used, and with unfavorable social and living conditions. In other words, the nature of these diseases is largely associated with the technical, economic, and organizational conditions of production rather than with the biological and genetic features of the body (although these causes cannot be excluded). But experience shows that workers involved in production processes with a sharp temperature differential, increased moisture, and drafts are vulnerable to these diseases.

This type of disease is frequently observed at machine building enterprises (especially under old production conditions), in construction, in chemical production, in metallurgy, and in repair operations (particularly where a large amount of manual labor is used, such as manual welding and assembly and erection operations). Shipbuilding also has a high amount of losses due to these causes. Fitters, electric welders, boilermakers, riggers, drivers, and longshoremen are subject to these diseases. It is characteristic that even in such progressive enterprises as the Novolipetsk Metallurgical Combine, which has the lowest morbidity in the industry (7 days per worker), the morbidity rate is significantly higher in the repair operations and in all of its repair shops, fluctuating from 11 to 15 days per worker per year. In many of the combine's repair shops, the incidence of this group of diseases ranks third, after colds and cardiovascular diseases. And at the repair and assembly shop, where complicated operations to repair and assemble metallurgical equipment are performed, the group of osteomuscular diseases outpaced all others and occupies first place with respect to the amount of work time lost.

The analysis conducted of the relationship between types of diseases and the content and nature of the labor points to the immense effect that the technical, organizational, economic, psychophysiologic, and social conditions in which the work is done have on the state of workers' health.

Today, having placed the human factor at the center of active social policy, we must learn to make rational use of society's labor potential and to eliminate losses of work time due to illness caused by flaws in the production process. With self-management, an enterprise's collective must decide for itself how to spend the resources it earns—whether to use it to pay for overtime and for sick days or to use it to ensure the enterprise's normal operation (including making supplier operations work smoothly, retooling production, and improving workers' social and living conditions). The result of this specific, single-minded work will be a reduction in morbidity, which is the equivalent to increasing society's work potential. Moreover, measures to protect workers' health

will make it possible to improve their efficiency, help lengthen their lives, and extend the age limit at which workers become unable to work.

UDC 614.2:008(477)

Restructuring in Health Care
18400255a Moscow SOVETSKOYE ZDRAVOOKHRANENIYHE in Russian No 9, Sep 88 pp 3-6

[Article by A. Ye. Romanenko, UkSSR Minister of Health: "Public Health Care on the Road To Restructuring"]

[Text] This is the third year of the 12th Five-Year Plan, and today we can discuss very objectively and frankly the first advances made by health care agencies and institutions in this republic in the light of the guidelines of the April (1985) Plenum of the CPSU Central Committee concerning radical restructuring of management of the economy and the nation's public life.

In the article, "Principles of Restructuring: Revolutionary Nature of Thinking and Action," published in PRAVDA on 5 April 1988, it was noted that the analytical work done by the party, the discussion of its results at the 27th CPSU Congress, and the decisions of the congress unequivocally indicated that fundamentally new approaches are needed in all areas: in the economics and mananagement of the economy, in social and spiritual matters, in the encouragement of activity and initiative among the working people.

It is only in this way that a new impetus can be given to development of our socialist society.

In this respect, organizational work acquires special importance in implementing the decisions made in 1987 and recorded in the "Basic Guidelines for the Development of Public Health Protection and Restructuring of Health Care in the USSR Under the 12th Five-Year Plan and in the Period up to the Year 2000." They define the strategic directions of the restructuring of this sector, which provide for specific steps to improve the quality of medical care, strengthen the material and technical base of health care and medical science, and effect a drastic increase in the output of medical equipment and effective medications.

In the last two years, fundamentally new organizational steps have been taken in the republic's ministry of health and in the treatment-and-prevention institutions of the republic to change the style, forms and methods of managing health care. An in-depth analysis is being made of the performance of administrators and chief specialists; and, in terms of end results, they are being held more responsible, and more is expected of them.

At the same time, the restructuring process is still going slow, particularly in terms of specific planning, monitoring of the execution of the established assignments, and performance of assumed duties. After all, even a well-argumented, comprehensively developed order that calls for well-grounded systematic steps in one sector or another and designates target dates and the individuals responsible for implementation is only a start. True restructuring in health care consists in achieving perceptible positive changes in the solution of the basic problems characterizing public health.

It is expressly such tactics that, in the spirit of restructuring, are being pursued by certain oblast health departments, which have been able to effect a steady trend in the improvement of such important indicators of health care performance as the decline in infant and maternal mortality and the reduction of labor losses related to disease and to postoperative mortality due to emergency surgical pathology and infectious and other diseases. Of course, the changes in these indicators were possible as a result of the persistent implementation of the advances of scientific and technical progress and the strengthening of management in many medical institutions.

The effectiveness of management is graphically illustrated by the fact that medical care is responsible for the extremely good health enjoyed by children and women not in merely one limited region, but in a number of oblasts—Vinnitsa, Volyn, Kiev, Poltava, Ternopol, Cherkassy and Chernigov—where there has been a stable trend toward decline in infant mortality for the last few years. This indicator has also improved in Kiev and in the Donetsk, Kharkov and Kherson oblasts.

At the same time, some serious oversights in pediatric extramural and hospital care have required attention in a number of regions of our republic.

We found defects in the effective monitoring and care of healthy children to be the cause of these shortcomings. A significant number of district pediatricians are not particularly alert to viral diseases, not enough is being done at home to prevent them—particularly in infants—and parents are not adequately informed as to the importance of seeking timely medical care.

On the other hand, the main causes of death among newborns in maternity hospitals are asphyxia, pneumonia, respiratory disorder syndrome and very premature birth. This was directly related to the inadequate skills of obstetrician-gynecologists, neonatologists and specialists in resuscitation, with serious consequences in the work of relevant clinical departments.

An in-depth analysis was undertaken of the causes of these phenomena, and specific information about the performance of physicians who made organizational, diagnostic, and tactical therapeutic mistakes was used; forms of joint work by prenatal consultants, district and

plant shop internists, and the health-and-epidemiological service to provide health screening for pregnant women were adopted on a broader basis; an efficient system for early detection of extragenital diseases and their prompt treatment has been strenthened.

Under constant monitoring is the quality of diagnostic work and treatment in the clinics of pediatrics, obstetrics and gynecology departments and, consequently, the impact of those clinics on the level of medical care rendered to women and children. It is this very system of measures that served as the basis of restructuring in the area of protection of mothers and children. In our opinion, it can provide long-term optimization of prevention, diagnostic work and treatment in this field.

Development of the outpatient-polyclinic service also required substantial change in approach. The volume and efficacy of health screening and, ultimately, the impact of health care on prevention of temporary and permanent disability and on the potential of manpower resources depend directly on the level of organization of this service and on how it is equipped and staffed.

On the whole, some positive tendencies have emerged in this republic with respect to development of extramural care. There has been overfulfillment of the plans for starting up modern polyclinics; a program for breaking medical and pediatric institutions into smaller units has been implemented, and the priority given to outpatient-polyclinic network staff is being adhered to. The means have been found to organize well-equipped, high-capacity diagnostic centers in oblast centers and large cities, which is based on the concept of comprehensive strengthening of the extramural service as an alternative in improving the quality of hospital care.

However, serious flaws continued to be observed in early detection and rehabilitation and, consequently, in the adoption of mass health screening. In order to change the situation, with all the diversity of health care problems, we devoted special attention to pathology of circulatory organs, which is the chief cause of morbidity and mortality. Experience has shown that it is possible to effectively lower the incidence of this pathology, primarily among significant groups of people with hypertension. A goal was set: to identify such individuals early and see to it that they were treated. In this area, the capabilities of the preventive approach are definitely vast. For example, 2,800 individuals per 100.000 population were identified in Zhitomir Oblast; one-tenth that number were identified in Suma Oblast, and one-fifteenth that number were identified in Kiev. Analysis of this discrepancy suggests the need for persistent promotion of work in this area, since the diagnostic tests are simple and available.

Thanks to the establishment of an orderly system for infarct-control services in this republic, the indicators representing losses among the above-mentioned patient groups tended to decline for a number of years. However, the situation has worsened in the last few years. Comprehensive analysis revealed that as many as 50% of the infarct patients were admitted to the hospital on the first day in the Odessa, Voroshilovgrad and Kirovograd oblasts, as opposed to only 12.4% in Zaporozhye Oblast. Making use of statistics has, essentially, provided the key to the necessary action in this area of emergency care.

At the same time, the most important restructuring tasks are related to changes in the largest-scale area of our work in the outpatient-polyclinic sphere—mass health screening. Rescheduling of target dates for implementing the latter offers an opportunity to improve its quality considerably. Temporary disability in the third quarter of 1987 in UkSSR was 2.5 days fewer per 100 workers than it was for the same period in 1986. If the decline was by 30.2 days in Zhitomir Oblast, but only one-fourth to one-third that figure in the Ternopol, Dnepropetrovsk, Donetsk and Odessa oblasts, a rise in disability was recorded in Kiev. This says something about the costs of medical care for workers in terms of certification of disability in major industrial regions and, consequently, about flaws in restructuring. On the basis of these data, in the first quarter of 1988 an analysis was made of work involving on the introduction of mass health screening in cities and rayons; changes in morbidity involving temporary and permanent disability due to the main classes of pathology were used as the principal criteria. It was decided to conduct universal mass health screening of adults, children and pregnant women in the base medical sections [of industrial enterprises] and polyclinics before the third quarter of the year, after organizing appropriate training of chief physicians of hospitals and polyclinics. Concurrently, a specific plan was prepared for setting up automated departments of preventive medicine in the republic all the way to the rayon level, on the basis of microcomputers, as well as to expand this work in 1988-1990 in a specific manner for each rayon and city. We believe that systematic implementation of this program for improving mass health screening will be of special value to the restructuring of health care.

A special place in the acceleration of the solution of health care problems belongs to medical science, and it must be frankly stated that it is not uncommon for inertia and obsolete stereotypes to reign here. It is imperative for us to properly define priorities, to concentrate personnel and resources on developing them, and to radically restructure planning and management of scientific research directly related to the system of medical science in this republic.

It is important to mention that we have restructuring models in this area as well. For example, the technique proposed by the Kiev Scientific Research Institute of Neurosurgery for treating cerebrovascular lesions using original balloon-catheters reduces treatment time and eliminates the need for complicated surgical intervention. Development by Ukrainian scientists of cryo-ultrasonic equipment and instruments used in oncology,

gynecology and otolaryngology was instrumental in improving the quality of treatment appreciably.

However, the future implies a much broader field of action. It is imperative to expand and deepen research in areas such as biotechnology, immunology, perinatology, microsurgery, childhood infections, methods of prevention and treatment of alcoholism and drug addiction, social hygiene and health care organization. Since there is no work being done at the Odessa Institute of Stomatology to improve the quality of dental prostheses, although an appropriate materials science laboratory has existed for 10 years, the Ukrainian Ministry of Health decided to stop financing that department and transferred the funds over to the organization of other centers of orthopedic stomatology. Duplication of research has been noted at a number of institutes. We must optimize the network of scientific research institutes and change the status of central scientific research laboratories, assigning to them the role of genuine research centers; there must also be expansion of the volume of production in existing experimental production workshops and accelerated merging of specialized institutes into scientific-production complexes. Research is being intensified in cardiology, oncology, psychiatry and neurology, and virology. Concurrently, there are plans for the needed volume of theoretical and applied research in medical genetics, ecology and medical cybernetics.

Refinement of organizational bases of management of medical science is an important problem in the plan for resolving the question of accelerating scientific and technological progress in this field. Optimization of the network of scientific research institutions under the Ukrainian Ministry of Health is an essential mechanism in this plan.

In particular, there are plans to establish large scientific associations: the Ukrainian Republic Scientific Hygiene Center consisting of Kiev institutes of nutritional hygiene and general and community hygiene, with an affiliate in Krivoy Rog, as well as the "Gigiyena truda" [Industrial Hygiene] scientific-production association, which will include three specialized scientific research institutes and a large experimental design office. It was decided to do away with a number of small, scientifically unpromising institutions and to raise the pay scale for research associates of a large group of institutes, after providing for the transfer of all category III institutions to higher ones, for a change of the specialties of a number of institutes to deal with health care and medical problems of a more pressing nature, and for a reexamination of the basic scientific directions of the activity of all scientific research institutes.

Our times not only impose high demands on health care, but also offer unprecedented opportunities for the practical deployment of capabilities and talents within restructuring, ranging from execution of building plans and acquiring allocated funds to bold organizational and scientific reforms. We are in full swing with restructuring, without stopping or recarving the colossal health care system, and we must be careful in our choice of decisions pertaining to the transformation and improvement of medical care.

At the same time, it is apparent that the system of socialist health care is taking one of its important tests before the people and state. In solving problems of restructuring medicine in this republic and in analyzing our resources and oversights from new vantage points, we are at the same time learning in the school of restructuring to place the highest importance on genuine professionalism and on a command of social and economic conditions—we are learning to follow in Lenin's footsteps in health care. There is an enormous amount of creative work ahead for us. This is how we assess the present and the future. This assessment includes, in particular, such subprograms of restructuring as the active adoption in health care of new techniques of management and cost accounting, greater scientific justification of territorial plans for development of health care that are under consideration, implementation at a rapid pace of construction of the principal categories of health care institutions, intensification of environmental protection, and additional measures pertaining to sanitary and hygienic oversight. Each of these subprograms requires a modern approach. But this is the mechanism of restructuring which we must adjust and refine.

UDC 614.2

Family Physician's Role in Outpatient-Polyclinic Care of Urban Population

1800255b Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 9, Sep 88 pp 7-12

[Article by V. M. Kozlitin and G. Z. Demchenkova]

[Text] The problem of protecting the health of the people of the USSR has always been a focal point for the Communist Party and the government of our country. In the new edition of the CPSU program, protecting the health of the individual emerges both as the goal of socialist society and as an essential prerequisite for effective socioeconomic development of the country; this puts basic problems before health care that are associated with lowering morbidity, disability and mortality and with prolonging the period of active employment and the average life span.

The slower rate of decline in morbidity and mortality and the stabilization of these indicators at a level that does not meet the current requirements of socialist society and is inconsistent with the present capabilities of medical science and health care practice are indicative of the fact that not all of the available reserves are being utilized.

The physician's contact with the patient is acquiring special significance—particularly that of the district physician, who sees more than 52% of all those who visit a polyclinic and who makes more than 70% of all house-calls for treatment purposes. A physician who is able to assess the personality and psychology of his patient shapes the patient's response to and views of medicine as a whole, as well as the extent to which the patient is satisfied with the medical care received. Numerous studies pursued in the USSR and abroad indicate that both the public and physicians are primarily dissatisfied with the nature and quality of physician-patient relationship. One of the objective reasons for this dissatisfaction is that physicians (among them, district physicians) are concerned primarily with therapeutic functions.

Another important reason is the continuing specialization of medicine and the inadequate attention given to the patient as an individual who has, for example, problems that are not merely of a medical nature and who has an individual psychology. At the present time the question of the integrating component in servicing the public is an acute one.

Since the very beginnings of the specialization of medical care, the coordinating and integrating role of the district internist as a necessary factor in the context of that specialization has been a point of discussion. At the same time, the volume and types of work of the district physician with regard to his integrating functions have not been scrutinized; a system of communication with specialists has not been set up, and problems of organizing the continuity of patient management have not been definitively resolved; and the rights and duties of the district physician have not been revised as related to the new duties imposed upon him. Virtually no specialist bears the responsibility for the general physical condition of a resident of a district or for the quality and effectiveness of his treatment.

At the present time, there are 74,887 urban therapeutic districts, 3,633 attached therapeutics, and 19,223 factory therapeutic districts in our country.

All the theoretical formulations that have been enlisted to channel the activities of the district internist toward those of someone who educates others in the habits of a healthy life-style, predominantly in the prevention of disease—not to mention the efforts to convert him into the principal figure in implementing various medical and sanitary measures—remain theoretical, since neither his professional training nor the organization of work nor work time enables him to implement these formulations.

Analysis of the results of different studies conducted in our country and abroad has shown the expediency of using the family as the organizational cell in the conduct of therapeutic and preventive work.

The results of investigations conducted at the All-Union Scientific Research Institute imeni N. A. Semashko indicate that, even under present conditions of insufficient information about family medicine, 97% of the polled residents of urban territorial districts voiced their wish that their family be seen regularly by one physician, which, of course, does not preclude treatment by specialists. As a social group, the family is distinguished by the solid bonds between its members; it is characterized by the same socioeconomic living conditions, the same life-style and diet, and common habits and characterological and medical and genetic features.

The existence of a relationship between state of health, living conditions and life style of the family has been noted in many studies. The largest role in development of various types of chronic pathology is attributed to the nature of intrafamily relations, psychological climate, established habits, dietary features, and other aspects of family life. The number of diseases caused by behavioral factors is growing.

Features of family life have an even greater influence on the health of children and on the development of the new generation. Various neurological and mental factors and conflict situations in the family play a significant role in onset and course of pneumonia, rheumatism, peptic ulcer and gastroduodenitis in children. Chronic pathology is encountered more often in children of families in which parents suffered from chronic diseases.

By actively correcting various aspects of a family's life, the physician becomes really capable of preventing the onset and development of pathology. The family is the lever whose use will make it possible to actually ensure primary disease prevention for the individual. The physician who uses the valuable focus of the family to preserve the health of each of its members finds in it a reliable ally in checking that each family member abides by requirements and recommendations.

The principle of family care of the public is not new. The history of the organization of medical care in Russia and the current experience of many countries confirm the advantages of this principle. The family physician can devote almost 30% of his work time to preventive measures and hygiene education (experience gained in GDR). About 90% of the patients start and end treatment with a family physician (Great Britain). By comparison, a district internist refers up to 52% of the patients who come to him to specialists (75% for treatment purposes and 25% for consultation).

The district-family physician principle demonstrates definite merits in a number of the agencies in our country that employ it, particularly in mass health screening. The physicians have great potential for preventing diseases; essential to their work is consultation

and the recommendations they make to healthy individuals, prenosological diagnosis, preventive treatment, and early treatment of initial forms of diseases; special days are scheduled for preventive work in the district.

Changes in the social characteristics of the public, its higher level of education and culture, and the growth of material well-being of the Soviet people raise the requirements that involved the organization and quality of the work done by health care institutions.

Sociologists, historians, philosophers, lawyers, educators, economists and medical men are studying the family. These studies will play an increasingly more important role, since the importance of the family is constantly growing on the path of socioeconomic development of socialist society.

The very existence of the family makes it necessary to establish the position of family physician and the existence of family medicine. Family medicine will be an extremely important component for affecting the health of the individual, the family, and society as a whole through the establishment and maintenance of contact between scientific know-how and everyday life and through the use of intrafamily relations for the effective preservation and strengthening of the health of the people.

According to the requirements spelled out in the "Basic Guidelines for the Development of Public Health Protection and Restructuring of Health Care in the USSR Under the 12th Five-Year Plan and in the Period up to the Year 2000," the purpose of the health care system is to preserve, maintain and strengthen health, to prolong the period of active employment, and to lower the mortality rate among the people being serviced. This goal can be reached if the work of district internists is redirected toward disease prevention among individuals in the family and if they are made responsible for the general state of health of the residents of a district.

The following are singled out as the main subordinate goals:

- Organization and implementation of individual work on disease prevention in familiesand promotion of a healthy life-style.
- Constant monitoring of the effectiveness and quality of preventive care and treatment and diagnostic care rendered to families and the rendering of assistance in setting up the entire complex of medical and social measures.
- Rendering of diagnostic, therapeutic and rehabilitative care to specific groups of patients.

Organization and implementation of individual work to prevent disease in families and the promotion of a healthy life-style implies the following:

- Rendering of care to optimize family structure and working conditions, recreation and diet.
- Work on normalization of intimate relations and of psychological microclimate in the family.
- Elimination of existing bad habits: alcohol consumption, smoking, inactivity, overeating.
- Improvement of sanitary and hygiene awareness: by discouraging self-treatment, encouraging the involvement of healthy family members in care of the sick, and focusing attention on problems of sanitation and hygiene.
- Development of specific recommendations for the improvement of the life-style of the family.
- Monitoring the state of health of family members with annual health screening check-ups.
- Regular check-ups of families at risk.

Constant monitoring of the effectiveness and quality of preventive care and treatment and diagnostic care rendered to families and the rendering of assistance in setting up the entire complex of medical and social measures imply the following:

- Monitoring of implementation of complex of measures prescribed by medical specialists, hospitals and other institutions.
- Organization of recommended therapeutic and rehabilitation measures.
- Monitoring of the quality and effectiveness of screening work in families registered with specialists.
- Organization of consultation and specialized medical and diagnostic care in the home.
- Monitoring of emergency medical care.
- Participation in the implementation of medical and social measures.

Rendering diagnostic, therapeutic and rehabilitative care to specific groups of patients implies the following:

- Treatment of acute diseases and exacerbated chronic diseases—including those outside the range of internal medicine—within the limits of its capacities and competence.
- Dispensary supervision of those who are sick for long periods of time and frequently, who have had acute diseases or suffer from chronic disease.
- Implementation of rehabilitative measures for patients.
- Rendering of medical care primarily in the home.
- Setting up permanent facilities in the home.
- Organization of care for elderly patients, seriously ill patients and terminally ill patients.
- Organization of visiting nurses for people who live alone.

The improvement of the physician's personal skills, the study and adoption of new forms and methods of work, the training of mid-level medical personnel and the monitoring of their performance, medical certification of disability, etc.—all remain important.

Such redirection of work is possible if the family physician meets the following professional requirements. He must:

- Be able to examine, diagnose, advise, treat and rehabilitate patients in an outpatient setting and in the home.
- Have adequate training for rendering medical care to patients suffering from problems other than internal medical problems and to those who require emergency attention.
- Have deontological training and skills in psychotherapy.
- Be aware of the structure and function of treatment-and-prevention facilities at all levels of medical care.
- Know the fundamentals of health statistics (keeping records of and analyzing activities, state of health of the public, etc.).
- Be knowledgeable in legal affairs, particularly in the matter of expert certification of fitness for work.
- Be able to disseminate information about and instill the habits of a healthy life-style.

Thus, the family physician is a specialist with professional training that is sufficient for the physician to be able to render preventive, therapeutic, diagnostic and rehabilitative care, including that of areas other than internal medicine, to the families assigned to him.

The position of family physician can be held by a physician who is well-acquainted with all aspects of the life of a family, has the trust of its members, is knowledgeable and has skills in the area of general medical practice, and has adequate knowledge about allied disciplines and the capabilities of other branches of medicine. In his practice, he must be able to examine and treat and to consult and perform preventive and rehabilitation measures either independently or with specialists.

The following are the principal, basic duties of the family physician:

- To render medical care to all family members, beginning with those of school age.
- To receive all those coming for the first time to seek medical attention, including patients that do not fall into the internal medicine category.
- To render medical care to all patients, including those outside the field of internal medicine, until they have recovered completely, and to refer them to specialists or order the next stage of medical care only in cases that are beyond the realm of his capacities and competence.
- To pursue preventive work and render medical care to 300-400 families (about 1200 people). Formation of the patient group is made on the basis of territorial area.
- To receive the public in a micropolyclinic, which may cover 3-5 territorial districts (about 3,500-6,000 people), which makes possible free choice of physician, use the team form of work and a differentiated wage scale.

The family physician should redirect the focus of his attention to rendering medical care in the home in order to develop contact with families, which will lead to a change in the physician's work hours: several times a week he will have evening hours, which are more convenient for patients and their families, whereas some morning or afternoon hours will enable the patients to consult physicians in narrow specialties, enable him to evaluate fitness for work, etc.

The main concern of the family physician will be to treat patients with routine or chronic pathology, see those who are healthy, organize care and treatment for the seriously ill. The list of diseases should be defined by the family physician and clinicians, but the results of the studies conducted at the All-Union Scientific Research Institute imeni N. A. Semashko indicate that we are dealing with only 14 diseases among adult patients, which account for more than 90% of the all the work done by the district internist in the polyclinic.

It will be necessary to develop the documentation that the family physician will have to handle; it is expedient to introduce a "family medical chart," with sections for preventive measures.

It would be most expedient to computerize the family medical charts (family register) with detailed description of work, living conditions, pathology, number of visits for medical attention, treatment and its efficacy, family health history, family dynamics, etc., using the most popular computer equipment, which would enable the physician to have a complete picture of all aspects of his work with families, as well as the necessary data pertaining to, for example, medical, legal, and social matters. It is possible, with computers, to develop algorithms of a diagnostic, therapeutic, rehabilitative or preventive nature, which would expand considerably the physician's ability to render better medical care to families, optimize the use of work time, and enhance his work.

The development of criteria and indicators to assess the performance of a family physician must be based on the end results, with family health and the public's satisfaction with medical care the main criteria.

Of course, the traditional training of the district internist does not meet the requirements of a family physician, and we need to have some training programs for undergraduate residency in the sixth year and internship after receiving a diploma. Emphasis should be placed on clinical training in internal medicine, pediatrics, obstetrics and gynecology, and geriatrics in volume and areas adequate for outpatient practice, mainly in the home. In-depth training in family psychology, psychotherapy and psychiatry, ethics and deontology is mandatory. A

considerable part of the training must include rehabilitation (medical, social, occupational); emergency care, including mastery of the necessary handling; and laboratory work, with learning of the skills in functional diagnostics, high-speed techniques and biochemical tests. Fundamentals of hygiene and sanitation (personal, general, social) are needed. Some knowledge of law is an important part of training (knowledge of civil rights, basic regulations dealing with health care and family practice, and temporary and permanent disability, etc.), as well as knowledge in matters of social hygiene and health care organization. The physician must somewhat computer-literate and must be able to use a personal computer.

The special training of the family physician should be preceded by the screening of students in their fifth year with psychological tests.

The family physician would best be assigned an apartment in the the region where most of the families he services reside, so that he can organize his work efficiently. His office to receive patients could be organized in the housing operation office [ZhEK] (building management office [DEZ]); but if the families live close to the polyclinic in which the family physician works, it would be best to see them in the polyclinic building. However, no matter where it is, the family physician's office must be equipped with kits for high-speed diagnostic tests of several parameters of urine and blood, with equipment for certain functional tests (ECG, spirometer, and instruments to measure hearing and vision, for example), and with drugs and equipment for emergency care.

The family physician can form groups among the patients, particularly those with chronic diseases, on the basis of their interests and can conduct various kinds of activities and health-improving measures (groups to quit drinking, groups to quit smoking, groups of individuals with hypertension, etc.).

The family physician schedules consultations with geneticists, psychologists, lawyers, educators and other specialists in his office.

Possibilities of the future include use of the team method for rendering specialized care to families, the family-oriented approach to treatment and prevention of hereditary pathology, and the problem-oriented approach to treatment of a number of diseases.

The performance of the family physician is checked by management only to the required extent, and the annual report of the family physician is prepared following a minimal outline. After some positive experience has been garnered in family medicine, it would be best to develop this area of medical care for the public with the establishment of appropriate institute departments for training family physicians on the pre- and post-diploma levels; publish the necessary textbooks and manuals of family practice, as well as an all-union journal with data on the organization and clinical problems of family practice; and organize research departments (and, in the future, an institute) that deal with clinical, organizational, legal, psychological, ethical-deontological and other problems of family medicine.

The territorial-family principle of rendering outpatient-polyclinic care to the urban population should be implemented in several stages.

The first stage is discussion and approval by the Ministry of Health of the concept, which could be expanded by, for example, defining in the proposed system the place of the pediatric service and the relationships to specialized systems of medical care and specifying the principles of the work of the family physician in different parts of the country.

The second stage is to devise a plan and program for training the family physician in accordance with the assumptions of the concept and then to have them approved by the Main Administration of Educational Institutions [GUUZ] under the USSR Ministry of Health.

The third stage involves conducting an experiment in several territories involving delivery of medical care to the pubic in accordance with the principles of territorial-family services, after a sufficient number of family physicians have been trained for this purpose in accordance with the approved program and their workplaces have been furnished with the necessary equipment and after a technique has been developed to comprehensively evaluate all aspects of the new system.

The fourth stage involves, after completion of the experiment and analysis of its results, making the necessary corrections in the training program and preparing a table of equipment, a system for evaluating performance and a differentiated wage scale.

The fifth stage consists of gradual replacement of district internists with family physicians in cities within the first two or three years (there could be a variant where this would happen by attrition) in most territories of our country, and, as experience is gained, it would involve an increase in number of family physicians trained at medical institutes and the inclusion in the training system of working district internists, which would make it possible to begin accelerating the replacement of physicians and implementing the adoption of the territorial-family principle of rendering outpatient-polyclinic care to the urban population.

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Karelian ASSR Health Status and Universal Medical Examinations

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[Article by Professor K. I. Zhuravleva, Academician of the USSR Academy of Medical Sciences N. G. Ivanov, B. A. Ilmykhin, D. F. Ispolatov, V. S. Karkhu, D. M. Malinskiy, and Professor L. Ye. Polyakov, Military-Medical Academy imeni S. M. Kirov, Leningrad; Leningrad Sanitation-Hygiene Medical Institute; Karelian ASSR Ministry of Health, Petrozavodsk: "Scientific-Practical Study of the Public Health Status in the Karelian ASSR During the Transition to Universal Preventive Medical Examinations"]

[Text] Implementation of the provisions of the new version of the CPSU Program on the Transition to Universal Preventive Medical Examinations requires scientific planning and the practical testing of a number of organizational and methodological questions pertaining to this major medical-social undertaking. Among these questions are the program, organization, and method for mass medical examinations of various population groups, the physician and middle level medical personnel requirements for such examinations, the informational base of mass examinations, and the final results of the examinations.

A definitive role in solving these urgent problems of theoretical and practical Soviet health services is played by a summarization of the experience gained by scientific and practical operations carried out on the basis of creative cooperation between medical institutes and scientific-research institutions and the offices and institutions engaged in the practice of public health. This kind of cooperation makes it possible to concentrate and to utilize with a high degree of efficiency the combined creative and material-technical potential in order to raise the quality of medical examinations at the first stage of the universal examination procedure and for subsequent scientific studies of ways to improve public medical services.

In the course of implementing the selective medical examination of workers in leading industrial sectors of the national economy in the Karelian ASSR we gained important experience through our joint scientific-practical efforts. The examination was conducted as part of the plan for the annual universal public medical examination in the republic and as part of the regional scientific-research program "Social-Hygiene Study of the Health Status and Public Health Safeguards of the Northwester Region of the USSR" (code name "Region").

The "Region" program as a whole has broader purposes and provides for a study of the public's health status and public health safeguards of the region, an evaluation of the morbidity and mortality level and structure as well as population reproduction characteristics in relation to specific socioeconomic and natural-climatic conditions of the region. It also provides for the preparation of recommendations emanating from that study for improvements in the health status of the population, for increases in the population's active longevity, and ultimately an increase in the region's productivity and productive forces. A study of the health status of the population in the Karelian ASSR by means of comprehensive medical examinations is one of the directions to be taken in the realization of this program.

In order conduct examinations in all 17 administrative rayons of the republic (except Petrozavodsk) we selected 26 of the most important industrial and agricultural enterprises. This selection also reflected the national economic structure of Karelia as a whole.

The organization of the medical examinations was regulated by an order of the Karelian ASSR Ministry of Health which defined the basic tasks of the comprehensive examination and stipulated the dates for completing preparatory measures (clinical-laboratory and functional studies, preparation and outfitting of examination premises, medical documentation, etc.). The order also appointed the persons responsible for the organization of the examinations and their timely conduct, and a work schedule was approved for the various rayons. The Ministry of Health held a special seminar-conference for the chief physicians of the rayons and their deputies at which the tasks of the rayon health chain spelled out and a methodology was selected.

The public medical examinations were conducted by road physician teams from the Military-Medical Academy imeni S. M. Kirov that consisted of a therapist, surgeon, neuropathologist, ophthalmologist, otorhinolaryngologist, dermatologist, dentist, and a public health physician administrator from the Leningrad Sanitation-Hygiene Medical Institute. The team included a gynecologist-obstetrician from the Central Rayon Hospital. Six to ten middle level medical personnel from the staff of rayon therapeutic-prophylactic institutions were included in the team to complete medical documentation, to record anthropometric data, and carry out other auxiliary functions. A highly skilled clinician was appointed as the team chief. This type of team worked for six days in each rayon. As can be seen, our medical examinations are classified as one-stage examinations in the terminology of G. A. Novgorodtsev et al [1] and for this reason were rather labor-intensive.

We conducted the public medical examinations and filled out the "Map of Intensified Medical Examinations" of 9,860 persons engaged productively in industry and agriculture. In addition, 3,411 persons were examined in the course of consultations with specialists from the medical teams.

The intensive medical examinations were given to workers and white collar workers at six lumber industry plants (2,869 persons), three wood and pulp processing enterprises (1,750 persons), 14 various agricultural enterprises (3,502 persons), the Kostomyk Mining and Dressing Combine (848 persons), the Kondopozh Stone Processing Plant (558 persons), and the Sortaval Sewing Factory (333 persons). The examined persons comprised 5,497 men (56.8%) and 4,363 women (43.2%); local residents comprised 59.2%, and persons who had moved to this area comprised 40.8% (primarily from the Belorussian SSR—12.5%, and 9.9% from other oblasts of the Northwest region).

The age group breakdown of the examined persons was the following: 24.5% under 29 years; 27% ages 30—39; 24.4% ages 40—49 years; 22.5% 50—60 years, and 1.2% of the examinees were 61 and older. No remarkable differences in the age composition of the women and men were observed. The predominant occupations among the men was a machine operator of variable specialization (41.9%). Repair shop workers comprised 22.9% of the examinees, lumber industry workers comprised 11.1%, and technical-engineering employees—6.7%. Among the women engineering-technical employees comprised 30.8%, lumber industry workers comprised 18.0%, and livestock breeders accounted for 17.3% of the examinees.

Concomitant with the medical examination, the working and living conditions of the workers were studied in accordance with a specially designed program. The study of the housing and living conditions indicated that the greater part of the local residents (89.1%) and newcomers (87.6%) live in individual apartments with utilities and in their own homes whereas 7.7% of the local residents an 5.2% of the newcomers live in communal apartments.

The sanitary and hygienic condition of work stations was measured by objective methods and interrogation. Only 13.9% of the interrogated men indicated that their work places were free of vocational hazards. Among the women that number was 32.5%. Men in the following categories are working under less favorable conditions: heat treaters, machine operators, livestock breeders, construction workers, and drivers. Among the women those categories were poultry and livestock breeders. The vocational hazards were mainly the following: noise, temperature fluctuations, drafts, vibrations, dust, air pollution, and dampness.

Special attention in the course of the examinations was given to the workers' lifestyle, and particularly to the prevalence of harmful habits. We found that almost everywhere up to 67% of the men and about 5% of the women smoke. There was a noticeable decrease in the proportion of smokers among older persons: 71.6% of the examined men under 39 were smokers whereas 60.9% of those 40 and over were smokers. Those percentages for women were 7.5% and 2.6% respectively. We found that 93% of the examined men and 65% of the women were alcohol users. Moreover, there were no pronounced differences in the proportion of drinkers for the various rayons of the republic. Of those persons more than 60% of the men and 62% of the women rarely use alcohol.

The results of the comprehensive medical examinations indicated that 75.5% of all the examined persons have one kind of chronic illness or other: That proportion was 69% for the men and 83.5% for the women. The variations in the different rayons of the republic were quite significant (from 56% in Kostomykshe to 89.9% in Belomorsk). The average percentages of examined persons with chronic illnesses in persons under 40 years was 62.1% (50.8—82.1%), and 89.8% (72.6—98.7%) for the age group of 40 years and over.

An average of 2.7 ailments (including tooth problems) was detected per person. More frequently than not persons were found to have two ailments (22.7%) and three (20.2%) ailments. The pathological load in women was 20% higher (3.1 ailments) than in the men (2.4 ailments). The number of chronic illnesses per examined subject was significantly proportionate to age for both men and women engaged in industry and agriculture. That number increased from 1.3 ailments in men aged under 29 years to 4.2 in those 61 and over. Those figures for women were 2.1 and 4 respectively. The level of chronic illnesses in the age groups over 55 years was about the same for men and women. The cited figures are somewhat higher than those found in the literature. Thus, I. N. Tyulpin and coauthors [2] found 1.3 to 3.6 illnesses per examined subject in their comprehensive examinations of persons in the 20 to 60 year age groups.

Working women on the average were more burdened by illnesses than men ($3096^{0}/_{00}$ as opposed to $2360^{0}/_{00}$) which is also characteristic for individual categories of illnesses (illnesses of the endocrine system, sense organs, circulatory system organs, urogenital system organs, skeletal-muscular system, and connective tissue). The level of infectious and parasitic illnesses, as well as those of the digestive tract (including teeth), skin, and subcutaneous tissue was about the same in both groups of the working population (Table 1). Among the principal illnesses one should note the high incidence of hypertension, sciatica, osteochondroses, cardiac ischemia, ulcers, chronic tonsilitis, pharnygitis, etc.

Table 1. Frequency of Identified Illnesses by Class of Illness (in accordance with the 11th International Classification of Diseases) Per 1000 Examined Subjects

Class of Illness	Men		Women	
	I	II	I	II
Infectious and parasitic diseases	26.3	24.5	21.1	23.9
Neoplasms	29.6	23.4	45.6	36.7
Endocrine system illnesses, digestive dysfunction, metabolic disorders	28.8	11.7	85.7	83.7
Blood and hemopoietic organ diseases	0.5	2.7	7.1	9.0
Mental disorders	24.4	11.1	87.6	45.2
Nervous system and sense organ diseases	587.4	529.3	785.8	646.7
Including refraction and accommodation anomalies	338.4	310.7	501.1	410.4
Circulatory diseases	349.4	343.7	563.5	482.2
Respiratory organ diseases	222.6	333.7	309.6	309.0
Digestive organ diseases	790.2	817.2	808.9	792.6
Including dental diseases	534.4	565.1	561.1	569.0
Urogenital system diseases	26.0	26.8	166.1	162.7
Epidermal and subcutaneous tissue diseases	72.4	68.7	66.8	90.4
Skeleto-muscular and connective tissue system diseases	127.6	105.6	234.1	167.5
Developmental defects	3.0	2.2	6.4	3.0
Injury aftereffects	35.9	41.9	21.1	25.9
Totals	2,324.8	2,343.2	3,211.5	2,879.4
Totals excluding dental diseases and refraction and accommodation anomalies	1,452.0	1,467.4	2,149.0	1,900.0

Note. I - industrial enterprises, II - agricultural enterprises

Of the total number of identified chronic illnesses 40% were recorded for the first time in the course of the present examination (1,071‰). Among the men that figure was 936‰, and in 1,243‰), i.e., an average of one new chronic illness was detected in each examined subject. According to the data of I. D. Bogatyrev and coauthors [3] 0.84 new illnesses per examined subject were recorded among urban residents in the course of comprehensive medical examinations. G. A. Novgorodtsev and coauthors [4] found 850 chronic illnesses per 1,000 examined rural residents.

The incidence of chronic illnesses detected for the first time by individual specialists may be considered one factor that reflects the quality and effectiveness of in-depth public medical examinations (Table 2). As can be seen from the cited data, the therapist and obstetrician-gynecologist jointly identified no more than 30 to 35% of the chronic illnesses. Therefore, examinations of the adult population by a team comprised of only the two indicated specialists, as has been accepted by certain authors, would not seem to assure the appropriate degree of identifying new illnesses so that this version of conducting the first stage of the universal public preventive medical examinations cannot be considered effective.

Table 2. Level (in %) of Chronic Illnesses Detected for the First Time by Individual Specialists

Specialist	Population of Karelia (1984)	Data of G. A. Novogorodtsev et al., (1976)***
Therapist	213.8	199.6
Surgeon	105.9	102.6
Obstetrician-gynecologist	137.0*	97.6
Neuropathologist	78.4	101.7
Otorhinolaryngologist	193.3	131.7
Ophthalmologist	242.8**	106.3
Dermatologist and venereal disease specialist	53.2	79.4
Dentist	169.1	

*Per 1000 examined women
**Including refraction and accommodation anomalies
***See monograph p 42 in aforementioned first footnote

A portion of the first-time diagnosed patients required hospital treatment and subsequent out-patient observation. As a whole, the number of persons with chronic illnesses who required hospitalization and regular effective treatment was 40 per 1,000 examinees. This exceeds the actual capability of the republic's network of therapeutic-prophylactic institutions by 1.5 times.

In spite of the widespread prevalence of the enumerated chronic illnesses, in the course of our examinations we found that of the total number of persons with chronic illnesses who had sought medical assistance, only one-third were registered on the out-patient books. Moreover, whereas that figure was 64.4% for rheumatism (from 30 to 100% for all the rayons), 78.1% for gastric and duodenal ulcers (57 to 100%), the percentages for hypertension, cardiac ischemia, gastritis, nervous system disorders, and periodontal diseases were 42.8% (21—56%), 47.6% (23—73%), 40.5 (22—75%), 12.2% (5—24%), and 2.5% (0.14%) respectively. The resultant data indicate the need for a significant improvement in the second stage of the universal medical examination procedure, i.e., regular observation and treatment of identified patients.

The comprehensive approach we adopted toward evaluating the health status of every examined subject enabled us to place the examinees into well defined health groups. Over 60% of the examinees are in health groups III and IV in which case most were in the lumber industry (68.5%), light industry (65.2%), and agriculture (58%). The most favorable indices were obtained for the workers in the mining industry (37%) which was attributable to the young age of the examinees (70% of the persons were under 40 years) and to appropriate vocational selection. The number of persons in health groups III and IV significantly grew in proportion to age: Persons under 40 accounted for 32.4% of those groups whereas persons over 40 accounted for 77.5% (2.2 times greater). Those figures for women were 55% and 83% respectively (1.5 times greater).

As a consequence of the selective comprehensive medical examination of the working population of the Karelian ASSR, the team method for implementing the first stage of the universal public medical examination program was approved. The experience gained in this effort indicates that the brigade method of identifying chronic illnesses is highly effective, although it is the most labor-intensive. The labor expended for the examination of 1,000 persons (7,430 examinations) came to 110 working days for physicians and 100 working days for middle level medical personnel. Therefore, the search for an efficient form of conducting such examinations that might lower labor expenditures while retaining effectiveness remains a vital problem.

The experience we gained indicates that universal public medical examinations can be successful only if the population is keenly aware of the need for the regular and timely supervision of its health as well as the need to follow all of the therapeutic and recovery measures designated by the physician. An important role in this effort must be played by the mass information media and sanitation education officials.

The high incidence of chronic illnesses calls for increased efforts in therapeutic-recovery operations performed by out-patient polyclinic and hospital institutions. In view of the limited opportunities for an extensive development of the health sector, this circumstance requires that those institutions continue to seek ways to improve the effectiveness of their operations on the basis of intensification.

The results of the selective study of the health status of the Karelian ASSR population, along with other special projects, underlie the preparation of an interdepartmental integrated "Health-90" program for safeguarding and improving the health of the republic's population for the period 1986—1990. This program is an integral component of the plan for the republic's social and economic development in the 12th Five-Year Plan period.

Footnotes

1. Novogorodtsev, G. A., Demchenkova, G . Z. and Polonskiy, M. L., "Dispanserizatsiya naseleniya v SSSR" [Universal Public Preventive Medical Examinations in the USSR], Moscow, 1984, p 84.

2. Tyulpin, I. N., Demchenkova, G. Z., and Polonskiy, M. L., "Puti povysheniya effektivnosti i kachestva profilakticheskikh osmotrov naseleniya" [Ways of Improving the Effectiveness and Quality of Public Preventive Medical Examinations], Moscow, 1981, p 22.

3. "Zabolevayemost gorodskogo naseleniya i normativy lechebno-profilakticheskoy pomoshchi" [Urban Population Morbidity and Standards of Therapeutic-Preventive Assistance], Ed. I. D. Bogatyrev, Moscow, 1967, p 454.

4. Novogorodstev, G. A., Demchenkova, G. Z., and Polonskiy, M. L., op. cit., p 36.

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Needed Improvements in Moscow Oblast Health Services

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No 8, Sep 88 pp 6-9

[Article by Chief of the Moscow Oblispolkom Main Administration of Health V. V. Lyabin: "Perestroyka Pathways in the Moscow Oblast Health Sector"]

[Text] The practical implementation of the concept of perestroyka in our society along with democratization, and improvements in managerial procedures demands an immediate restructuring of public health safeguards.

The "chronic diseases" and problems that have evolved in the Moscow Oblast have resulted in the public's pointed dissatisfaction with all levels of medical services. Of course, objective reasons may be found for this situation. Among those reasons one should first of all note errors that

have been made in the planning and financing of the health sector's development where only narrow departmental interests were taken into consideration.

The most important public health factors, the demographic and social infrastructure, have remained outside the realm of the planning organizations, including the Main Health Administration. Narrow regionalism and the championing of selfish interests have led to a disproportionate development of the health sector in some regions of the oblast. Consequently, the agricultural rayons in particular (Volokalamskiy, Istrinskiy, Domodedovskiy, Shakhovskiy, and Pushkinskiy) have not been getting the attention they require. The situation has been extremely acute in cities that do not have a major industrial sector (Zvenigorod, Vereya, Aprelevka, Zheleznodorozhnyy, and Reutov). The level and scope of medical services availability in these cities and rayons has been drastically reduced.

Because of distortions and errors in planning, inattention to the development of the social sphere, and an ineffective utilization of allocated funds, the availability of hospital and out-patient polyclinic facilities in the oblast is only 79% and 72% respectively of the currently established standards. The situation is even worse within the system of oblast institutions where there is a shortage of 9,000 special treatment beds. The pace of the health sector's development in the oblast has slowed in recent years, and the proportion of funds allocated for health needs has started to decrease. By 1988 the total expenditures for these purposes was reduced to five percent of the oblast's total budget.

It would be incorrect to consider that objective factors only are of paramount importance here. The slowdown in the health sector's have been and are still attributed to inaction on the part of many health sector administrators and the consequences excessive regulation of the Main Health Administration's operations.

One cannot discount the fact that under these circumstances supervisors of health sector offices and institutions have not demonstrated a sense of scrupulousness and have not been sufficiently thoughtful when making decisions about social problems or when discussing the future development of individual sectors of the national economy. Nor have they produced any positive solutions to problems concerned with industrial and engineering safety, ecological problems, and medical services for industrial enterprise workers. The number of medical-hospital units has decreased during the years of the Ninth and Tenth Five-Year Plan periods. Lacking medical-hospital units until the present day are such major industrial enterprises as the Stupinskiy Metallurgical Combine, the machine-building production association, the Yegorev Paper and Pulp Combine, the Kurav "Leader of the Proletariat" Textile Combine, and Roshal Chemical Combine.

The lack of attention given to public health needs became evident very quickly. The population growth rates have slowed (especially that of the rural populace). Labor losses in the national economy due to temporary disability, and initial disability departure significantly exceed those figures for the RSFSR as a whole.

Under such circumstances it was important to find correct guidelines and define the basic problems that need to be addressed in order to affect a radical improvement in the situation. A turn in that direction was the comprehensive Health Program approved in 1986 by the buro of the CPSU Moscow Oblast Committee, the executive committee of the Moscow Oblast soviet of people's deputies, and the presidium of the Moscow Oblast Council of Trade Unions. But a program will remain a program only without economic reinforcement and rigid supervision of its execution. These two principles have been secured and have played an effective role. The first results of the program's implementation were summarized in February 1988 at a session of the oblast party-management aktiv. For the first time in many years plans had been completed for opening up health facilities under construction. Major medical-hospital units opened up in Zhukovsk and Krasnogorsk as did major maternity and child care centers in Lyuberetskiy, Balashikhinskiy, Ozerskiy, Orekhovo-Zuyevskiy, and other rayons.

As a result of new construction between 1985 and 1987 the number of hospital beds in the oblast grew to 1490 which made it possible to resolve a number of serious problems with regard to offering specialized hospital services. In the last three years alone more than 30 specialized departments accommodating 1,739 beds have been organized. Major inter-rayon departments have been opened up, such as the laser surgery department in the city of Vidnoye, the vascular surgery department in the city of Fryazino, and the department of neurosurgery in the city of Ramenskoye. Construction has begun on an oblast diagnostics center on the grounds of the Moscow Oblast Scientific-Research Clinical Institute (MONIKI) imeni M. F. Vladimirskiy. Research and project operations have started in connection with the construction of two oblast hospitals in the Noginskiy and Odintsovskiy rayons.

The Moscow oblispolkom has set a goal for the end of the 13th Five-Year Plan to provide the established standard level of hospital and out-patient polyclinic facilities for which 560 million rubles have been earmarked for state capital investments.

It is important that supervisors of industrial and agricultural enterprises have started to show an interest in the resolution of the public health problems. Thus, the kolkhoz imeni Kirov in the Balashikhinskiy Rayon has built a two-story polyclinic building with a swimming pool for infants for which expensive equipment has been purchased. The kolkhoz is maintaining a portion of the specialized physicians at its own cost. Physicians are

awarded bonuses for good work twice a year, and middle level medical personnel are awarded four times annually. The kolkhoz has built a children's combine with a swimming pool, a pharmacy, dining room, and hospital-dispensary. The Borets kolkhoz in Ramenskiy Rayon has built a standard two-story dispensary which has been equipped, and maintains a portion of the specialist physicians at its own cost. The kolkhoz has consigned a bus for providing preventive and fluorographic examinations to village residents. Health sector are being thoroughly resolved at the Balashikhinskiy Machine-Foundry, the Voskresensk "Minudobreniya" Production Association, the Ramen Instrument-Making Plant, the Orekhovo-Zuyev Paper and Pulp Combine, and others.

One cannot say that everything is going smoothly. Barriers must be overcome and people must be convinced of the obvious in the course of resolving many problems. There is a serious problem with regard to the material base for institutions that provide rural medical services. Out of the 102 rural hospitals 60 percent are housed in makeshift facilities. The same can be said for obstetric-gynecology stations and dispensaries. However, in spite of that, the oblast Agro-Industrial Committee has not included a single dispensary in its 1989 construction plans and is planning to build only one 50-bed hospital in the Yegoryevskiy Rayon.

The Moscow oblispolkom has decided to use state capital investments to construct 18 hospitals accommodating 218 beds as early as the 1988—1989 period, but the Agro-Industrial Committee has not altered its position.

Ecological problems are being poorly resolved. Although approximately 700 air pollution decontamination stations have been in operation, the air pollution has not yet been resolved in the Voskresenskiy, Stupinskiy, Klinskiy, and other rayons, or in the city of Elektrostal. Year after year the planned measures to expand decontamination facilities are not being carried out. The program to improve working, recreation, and everyday operational conditions at industrial and agricultural enterprises is being implemented slowly.

Not everything that could be done has been done with regard to improvements in the operation of the therapeutic institutions themselves, particularly with respect to the efficient utilization of the available staff and economic potential of the health sector. This is essentially one of the principal directions of perestroyka in the oblast. The first steps in this direction have been taken. In conjunction with the Moscow Institute for the Planning of Cultural, Recreational, Athletic and Health Facilities, plans are being completed for the location of therapeutic institutions in the oblast that take into consideration all of the determining factors. A computer center which has been assigned the task of developing universal programs for general preventive public medical examinations. Those programs have already gone into use at therapeutic institutions in the cities of Voskresensk, Fryazino, Chekhov, Stupino, and others. Automated control system programs have been prepared for economic planning and staffing problems.

The chief physicians at the central rayon an city hospitals have been provided with a methodology towards reducing the overall mortality rate, as well as the mortality rate for cardiovascular, pulmonary, and carcinogenic illnesses. Scientific-research institutes have designed special system programs for this purpose. Efforts are being made in the health sector to develop a broad area of cooperation between practical public health workers and scientific associates at the leading institutes of Moscow.

The RSFSR Ministry of Health Planning Institute has designed a modular procedure for transferring the capital construction of therapeutic institutions to an industrial basis. The Moscow Institute of Radio Engineering and Electronics in conjunction with MONIKI imeni M. F. Vladimirskiy has manufactured apparatus and introduced new methods of laser therapy. Major scientific-research projects in the health sector have been initiated by the Moscow Scientific-Research Oncology Institute imeni P. A. Gertsen, the inter-sector "Ocular Microsurgery" [Mikrokhirurgiya glaza] scientific-technical complex, the Moscow Scientific-Research Hygiene Institute imeni F. F. Erisman of the RSFSR Ministry of Health, and many others. This kind of approach has made it possible to alleviate significantly the acute problem of providing specialized medical services.

The transition to a new effective mechanism of management is one of the principal directions of restructuring in the health sector. The high degree and speed of benefits gained by the introduction of the new economic principles into the operations of medical institutions should not be overestimated. Among such principles are first of all the brigade form of labor organization. An analysis of the operation of such brigades has demonstrated that not only has there been an improvement in the quality of treatment in those departments in which they have been organized, but there has also been an increase in hospital turnover so that more than an additional 4,000 patients were accommodated for treatment as early as in 1988.

Beginning in April 1988 a new form of operation, the rental contract, was initiated. By the end of the year 200 institutions will adopt this economic form. Perceptible results have already been obtained. Thus, after one month of operation under this system the Lyuberets cost-accounting stomatology clinic increased its services output by 30 percent on the rental contract basis, and the wages of physicians increased by 70 rubles per month.

A number of pressing problems were successfully resolved through the organization of medical cooperatives. The oblast currently has 200 cooperatives in various areas of specialization and 300 physicians are engaged in private practice in areas for which there is a shortage of specialists. In the last two years alone 28

cost-accounting departments have been formed in polyclinics and dispensaries. Consequently, the plan for paid medical services was fulfilled by 115 percent and increased by 36 percent over the level of such services last year.

Special attention is being given to personnel questions under the new economic conditions. In 1988 the economics training for the entire supervisory apparatus in the health sector was completed, and a department for advancing the qualifications of middle level medical personnel was opened at the Ramen Medical Academy. A department for the advanced training of physicians of the oblast to be located at two scientific-research institutes is being prepared for operation in 1989.

Everything that has been done in the past two years represents only the first steps along the road of perestroyka in the oblast's health sector, and there have been some small positive advances: The reduction in morbidity with temporary disability and reduced general and infant mortality that has occurred do not constitute grounds for complacency. The 19th All-Union Party Conference is aiming for an innovative approach to the resolution of pressing problems in the health sector. Therefore, adjustments are being made into the operational plans of the Main Administration of Health that are designed to intensify democratic principles within the health institutions. The elections of health supervisors that were carried out for the first time in the Khimkinskiy and Serpukhovskiy rayons at the medical equipment repair plant, disclosed serious contradictions between individual supervisors and evaluations of their work by the plant staff. In a number of cases there was an improper tendency in the collectives to obtain some kind of privileges and advantages without due consideration given to the actual contribution of each associate to the cause of public health. Because of the lack of glasnost the types of labor incentives did not have the proper educational significance, and shortcomings and errors that were committed were not appraised.

There will be many more problems we shall encounter along the road of perestroyka in the health sector. It is important that we do not lose our head and that we efficiently respond to the slightest changes in the situation and do all we can so that words about the importance of safeguarding the public health do not become separated from deeds.

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Safeguarding and Strengthening the Health of the People—A Matter of Paramount Importance

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[Article by V. G. Panov, First deputy RSFSR minister of health]

[Text] The 19th All-Union party conference was an important event this year; it analyzed progress in the implementation of the decisions of the 27th CPSU Congress, summarized the achievements of the first half of the 12th Five-Year Plan, discussed questions of further democratization of the life of the party and society, disclosed additional reserves and formulated new tasks for revolutionary restructuring of the political, economic and social life of our country.

Medical workers can no longer be uninvolved observers of the events that are occurring. From the standpoint of the decisions of the 27th CPSU Congress and 19th All-Russian party conference, it is imperative to sum up the preliminary achievements and define the next tasks in the area of protection of public health in the immediate future. Strengthening the health of the people and refining the entire system of rendering medical care should be a matter of paramount importance to us.

In accordance with the tasks spelled out in the "Basic Guidelines For the Development of Public Health Protection and Restructuring of Health Care in the USSR Under the 12th Five-Year Plan and in the Period up to the Year 2000," there is an urgent need to rethink the question of health care management, improve its style and methods, and plan medical care on the basis of investigation and long-term forecasting of demographic processes and public health.

The substantial socioeconomic transformations that are taking place in our country and the improvement witnessed in the system for protecting public health have had a beneficial effect on the demographic situation in this republic, and public health indicators have improved. In the last 15 years alone, the birthrate has risen by 11.8%, infant mortality has dropped by 16%, maternal mortality has dropped by 30% and natural population growth has increased by 4.8%. The average life span has increased by 1.6 years (from 68.1 years to 69.7). Morbidity involving temporary disability has dropped by 17% in terms of days and by 24.5% in terms of cases. The indicator for primary permanent disability has decreased by 12.5%. There has been a considerable decline in infectious morbidity. As compared with 1979, the incidence of viral hepatitis is 35.7% lower, that of typhoid fever and measles is 2.7 times lower, while bacterial dysentery has declined by 33.9%.

Those working in health care undoubtedly made a contribution to these achievements. However, we hardly have sufficient grounds to extol them, when many indicators of public health leave much to be desired. For example, overall morbidity has risen by 16.7% in the last 15 years, and the maternal death rate is still high. The incidence of cardiovascular disease shows no tendency toward declining, and that of oncological diseases has risen by 19%. The incidence of acute intestinal infections, as well as of enteritis and gastroenteritis, is still high; as compared with 1979, these indicators have risen by 14.5% and 22.6%, respectively. In spite of the work being done, there has been a 3.8-fold rise in drug addiction in the last two years. The incidence of chronic

alcoholism has increased 1.6-fold over 12 years. Particularly alarming is child traumatism, whose indexhas risen by 17.8% in seven years.

All this places a new complex strategic task before health care agencies and institutions—that of examining health problems from a broad social vantage point, assuring active adoption of a healthy life style, and completely meeting all requirements of urban and rural residents with respect to highly skilled medical care and improving the quality of that care radically.

The time has come to move from the development of plans and various directions to actually implementing them. This is particularly needed by the complex interagency program, "Public Health of RSFSR in 1986-1990," which was approved by the RSFSR Council of Ministers and All-Union Central Council of Trade Unions and involves a complex of social and medical measures to safeguard public health through mass health screening.

Here are a few items in this program.

As compared with the 11th Five-Year Plan, there must be a 20% increase in new hospital beds and a 25% increase in polyclinics, which would constitute 133,400 beds and 289,700 polyclinic visits per shift, respectively. There will be considerable improvement of the material and technical base of institutions such as pediatric institutions and maternity hospitals. As a result of the implementation of the "Zdorovye" program, the number of individuals working in deleterious conditions has been reduced in the RSFSR by 1.4 million, including a reduction of more than a third of a million such women.

Implementation of these social and medical measures will make it possible to improve the quality and level of medical care, reduce work time lost due to illness by at least 15%, lower the mortality indicators, particularly among children and the employable population, and reduce the primary disability index by 11%.

One must bear in mind, however, that implementation of even the very best, most reasoned, scientifically grounded plans will require a great deal of intensive work, discipline and organization, as well as scientific research, enthusiasm on the job, and mobilization of all resources.

At present, the task facing health care administrators is to perform an in-depth critical analysis of existing programs, make the necessary corrections in them, and see that they are implemented without delay—all to be done as quickly as possible.

In fact, this must be done right now, since the "Basic Guidelines" call for new approaches to safeguard public health and improved forms of medical care organization, such as the development of individual and cooperative work, free choice of physician, and, among other things, the organization of day infirmaries and of permanent facilities in the home.

But this should not be limited merely to territorial program developments and correction—the main thing is to render practical assistance in preparing urban, rayon and sectorial programs.

Unfortunately, this is not being done everywhere. For example, in the complex programs of the Dobryanskiy and Krasnokamskiy rayons in Perm Oblast, where industry is well-developed, there has been no reflection of steps for further improvement of working conditions and labor safety, for improvement of the environment, or for ensuring a healthy life-style. In Ulyanovsk Oblast, city and rayon programs essentially echo the directions of the oblast program, without any new work actually being done or any consideration given to local conditions.

In the context of the restructuring of health care,universal adoption of special-program planning assumes broad, scientifically grounded work on all problems and identification of all factors and trends upon which public health depends.

Disregard for this rule has resulted in proper attention not being given to aspects of the medical and health service provided to the ethnic groups of the North within the regional "Zdorovye" programs developed in the past for a number of ASSRs, krays and oblasts; the indicators of overall mortality among the groups are 1.7 times higher than those for the total population of the regions in which they live, and the infant mortality rate is twice as high as the infant mortality rate observed in the total population of those regions. Overall morbidity among these groups remains high. In view of the great social and political importance of this problem, the RSFSR Ministry of Health, together with local soviet agencies, have developed the program called "Health of ethnic groups of the North in 1988-1995," which was subsequently approved by the RSFSR Council of Ministers. This program calls for total mass health screening of reindeer breeders, fishermen, hunters and children by 1990, for which preventive care and rehabilitative treatment departments and offices will be set up. In 1988-1995, hospitals with a total of almost 4,000 beds, polyclinics that will handle 13,200 visitors per shift, 25 walk-in medical offices, and 59 paramedical and obstetrics centers will be built and 66 pharmacies will be opened. A goal has been set to fully man all medical institutions by 1990, thereby providing the peoples of the North with a sufficient volume of high-quality medical and diagnostic care. The program includes only medical aspects; however, it should be implemented in conjunction with social and intersector programs, which will permit better solution of the health problems of peoples of the North from a broad social vantage point.

At present, it would be impossible to solve our public health problems and improve the quality of medical care by merely expanding the health care network, building up the capacities of institutions and increasing the number of medical personnel, but at the same time making no radical changes in the style, methods and forms of the work done in health care agencies and institutions and failing to use an integrated approach to health problems from a social standpoint or to implement additional increases in the volume and quality of preventive measures.

Health care agencies and institutions have not yet achieved radical improvement in preventive work, and the preventive orientation of their work as a general principle of Soviet health care has not yet become a priority for them. For this reason, it is not by chance that in this republic preventive visits constitute only 20% of all visits that a physician makes to a resident. The existing system of preventive examinations for the early detection of oncological diseases and tuberculosis is ineffective. While there is wide coverage with such examinations, identification of disease remains at a very low level. The identified patients are often not followed up for additional examination and treatment (Gorkiy, Tambov and other oblasts).

Preventive care departments that are set up at polyclinics—at present, they number more than 1,000 in this republic—do not perform their role as envisioned, and they function in a merely formal manner, doing less work than they could, with poor efficiency. For this reason, with the large number of duplicated exams, detection of disease constitutes hundredths of a percentage point in some cases, and there are many cases of advanced oncological diseases and tuberculosis. Many cardiovascular, pulmonary and gastrointestinal tract diseases are detected virtually at the disability stage.

Coverage and quality of periodic physicals for industrial workers are poor. For example, with a republic average of 94.6%, coverage of workers with regard to medical examination constituted 87.3% in Arkhangelsk Oblast, 88.9% in Chita Oblast and 89.2% in Saratov Oblast.

Such a situation does not help in the early detection of social and environmental factors that have an adverse effect on human health, and it leads to progression of diseases to the chronic stage and to disability of workers.

At the same time, the contribution that ecological factors alone make to the health of the people constitutes 20% at the present time. Medical workers are not yet sufficiently oriented toward establishing cause-and-effect relationships between environmental factors and the state of public health.

A study of morbidity in the Russian Federation revealed that cardiovascular diseases have been holding a steady first place in its structure in recent years. The incidence of essential hypertension per 100,000 population has grown from 180 in 1975 to 312 in 1986; that of ischemic heart disease has grown from 90.0 to 139.8; and the figure for disability due to these diseases has almost doubled. The incidence of diabetes mellitus has doubled, and that of malignant neoplasms has increased by 12%.

This situation is due to the effect on man of the aggregate of social, economic and environmental factors. Among them, we should mention first of all working conditions, quality of the environment, poor diet and unhealthy life-style.

The RSFSR Ministry of Health deems it expedient to conduct in various territories of this republican an in-depth analysis of the state of public health and all factors affecting health, as well as to elaborate specific additional steps to improve the ecological and sanitary situation and to inform the community about them. This would permit effective monitoring of their implementation, and, with a well-informed public, it would make it possible to more effectively eliminate the negative phenomena.

This year already, with the involvement of scientific research and design organizations and planning agencies, we should begin preparation of programs for the 13th five-Year Plan that deal with normalization of the ecological situation, elimination of the deleterious effects of the environment on public health at every enterprise, at the city, rayon and administrative territory levels. Medical and scientific research institutes, together with clinical health care institutions, must perform some important tasks dealing with investigation of the causes of worker morbidity and with the development of scientifically grounded recommendations for preventing and lowering worker morbidity.

In the decree "Steps for Further Improvement of Public Health Protection and Strengthening the Material and Technical Base of Health Care," the CPSU Central Committee and USSR Council of Ministers have formulated the task of achieving a 15% reduction in morbidity involving temporary disability of blue- and white-collar workers in the 13th Five-Year Plan.

Medical workers as well as the administrators of health care agencies and institutions must take an active stance in the performance of this important task. The main direction of their work at this stage should be to expand and deepen primary and secondary prevention, as well as to further improve mass health screening of the population.

In spite of the fact that universal health screening of the public holds an important place in current preventive work, proper attention to this matter is still not being given in many territories of the Russian Federation.

Only 305.5 people per 1,000 population are registered for check-ups. In some territories, the figure is even lower (206.9 in Buryat ASSR, 259.5 and 233.9 in Ryazan

and Kaluga oblasts, respectively). Coverage by screening for various diseases is low: 76.2% for hypertension, 60.4% for chronic bronchitis, 89.1% for chronic nephritis, 91.4% for myocardial infarction and 98.5% for glaucoma.

The quality of the screening of patients with chronic diseases is also poor. Patients are not seen often enough, they are not examined completely, and therapeutic and health-improving measures are not implemented promptly. For example, a study of a sample revealed that 75% of the patients with advanced stages of oncological disease had visited a polyclinic an average of three times in the two years preceding establishment of the correct diagnosis. Many of them had been treated in hospitals; 31% of all patients with advanced stages of disease had previously been under dispensary observation.

The existing situation requires that administrators of health care agencies and institutions take immediate steps locally to put this matter in order. This is the principal task for the present, since it will be necessary to cover the entire population of this republic with mass health screening by 1995. Universal health screening of the public will permit establishment of a single system for assessment and systematic observation of the state of health of each individual. Greatest attention should be given to safeguarding the health of women and children, with the main efforts directed toward further reduction of child mortality and strengthening of the health of women.

Several territories of the RSFSR (Tatar, Mordovian ASSR, Altay Kray, and, among others, the Orlov and Orenburg oblasts) are exemplary in their single-minded, creative work in the protection of the health of mother and child, and they have achieved the lowest child mortality rates.

However, the problem of protecting mother and child is still one of the most acute social problems of contemporary health care. Unfortunately, local health care agencies and institutions have not given priority to the development of this service, and they have not concentrated all their material and manpower resources, their scientific potential, or the efforts of the general medical network on protecting the health of mothers and children or on lowering child mortality. The material and technical base, supplies, provision of personnel and level of development of specialized obstetric and pediatric care are dramatically behind the general medical network.

Such territories as the Leningrad, Kalinin, Kursk and Volgograd oblasts, the Khabarovsk and Krasnoyarsk krays, and the Yakut and Chechen-Ingush ASSRs not only fail to give priority to the development of a base for this service, but also fail to give a proportionate amount of attention to the matter. Our first and foremost duty is to correct this situation. There is still not enough preventive work being done in prenatal offices and pediatric polyclinics, and the creative search for new forms of work is negligible.

According to the "Basic Guidelines" and today's requirements, protection of mother and child must have a high priority in the work of health care agencies, since the demographic situation in this republic cannot be improved and the most important social task of improving the health of the entire population cannot be performed without having first solved the problem of preserving the lives and strengthening the health of mothers and children.

Outpatient-polyclinic institutions play a special role in implementing this task. They must be "front line" institutions for safeguarding health as well as the principal base for organizing and performing mass health screening of the people.

However, a study of the need for outpatient-polyclinic care revealed that there is a shortage of polyclinic institutions amounting to one million visits. Local health care agencies must intensify development of the network of such institutes and establish diagnostic centers. By 1990, the Russian Federation will have to organize 15 such centers, and by 1995, such centers must be in each administrative territory.

The complicated and important tasks that must be implemented in the restructuring at the outpatient-polyclinic level can be performed only if the forms and methods of work of the district physician are improved.

In performing health screening, the district physician must work in close contact with the community, and, adhering strictly to a preventive orientation, he must persistently instill in the people a conscious and responsible attitude toward their own health and must struggle for the establishment of a healthy life-style. According to the statistics, two-thirds of the public today do not exercise, almost every other person is overweight, and 70 million people smoke.

The role of hospital care will increase significantly because of the implementation of measures for disease prevention and mass health screening. The established structure of the network of hospitals, which developed within the traditional guidelines of administrative-territorial division, no longer conforms to the requirements of scientific and technical progress. In the immediate future, each administrative territory will have to perform scientifically grounded, efficient planning of placement of the bed resources and revise the types of specialized medical care rendered in hospitals to conform with population structure and size and level of morbidity.

During the current five-year plan, in fact, a solution must be found for such an important social problem as placing chronic disease patients who merely require constant

care, rather than active treatment, in special cost-accounting hospitals (or departments or wards) or in hospitals funded by the national budget. It is imperative to continue with comprehensive organization of day hospitals at polyclinics and permanent facilities in the home. This would make it possible to improve the efficiency of general and specialized hospitals and to reduce the number of patients who are refused hospitalization, but who really require such care because of their state of health.

There should be more active improvement of conditions of hospitalization, since more than one-third of the hospitals should be demolished (11%) or undergo major repair (23%) because of dilapidation. A larger number of beds added with construction should be used to replace the dilapidated ones, to give hospitals more bedspace, and to bring their ward space up to standard.

The material and technical base must be further strengthened and the structure and organization of hospital operation improved everywhere in order to intensify the treatment and diagnostic process through more efficient use of beds and other hospital resources and use of modern technology and the latest advances of science and industry.

In spite of its achievements, medical science is still lagging behind the needs of practical health care. There are few major, comprehensive efforts aimed at a radical solution of the most important problems of health care. Improvement of health indicators and health care delivery to the population is not yet the ultimate goal of scientific research. The main reason for this is that 60% of the research topics are selected by scientific research institutes on the basis of an established stereotype with easier tasks and less work; as a result, substantial positive changes—not to mention radical changes—are not effected with regard to solution of the most important medical problems. Health care administrators do not manifest persistence or interest in having scientists pursue investigations whose results public health indicators depend on.

At the present time, we should include among the main tasks for medical science the evaluation of trends in environmental changes and of factors that have an adverse effect on public health, the formulation of a strategy for safeguarding and strengthening health, the analysis of the demographic situation, the expansion of comprehensive preventive work, and the development of the scientific bases for controlling the most widespread diseases.

In order to achieve radical changes in health care and perceptible results in the struggle for the health of the people, it is imperative to radically restructure the operation of health care agencies and institutions and to encourage a business-like attitude and creative initiative, as well as occupational mastery in very medical worker, scientist, or specialist and in administrators of all ranks.

These and other public health care problems will undoubtedly be reflected in the work of the coming All-Union Congress of Physicians, which will be a notable event in the history of Soviet health care.

Chazov Comments on Criticism Regarding Ministry Position on Medical Cooperatives

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No 3, Jan 89 p 20

[Letter written by Ye. I. Chazov, USSR health minister, to OGONEK]

[Text] In two issues of OGONEK—No. 49 and No. 51—you published material in which the position of the USSR Ministry of Health regarding the leasing of scarce, expensive imported equipment to so-called treatment-and-diagnostic cooperatives was criticized. To explain our position, I could refer to the answer that was given to the editor of newspaper IZVESTIYA regarding the matter. However, considering the immense significance that, apparently, you attach to the matter in the context of the perestroyka that is going on in our country—judging by the article's subhead "perestroyka and inquiry backed up by action"—we felt it necessary to supplement the answer we gave to the newspaper.

Your correspondent begins the article with a reference to the work of the physicians' congress, which, in her words, certified the preservation of command-administration method in health care. We shall leave that assertion to the conscience of the correspondent, for, in the opinion of the delegates, there had never been in the history of Soviet medicine a congress so democratic and so replete with constructive criticism. But the main thing—which the correspondent forgot to report—was that the Ministry of Health order under criticism was issued in a version of a resolution of the physicians' congress and the plenum of the Central Committee of the trade union of medical workers. So it came about not because of the "injunction style of leadership of the Ministry of Health," but as an expression of the opinion of the general medical community.

The USSR Ministry of Health has no legal authority to open or close cooperatives. That is a matter for the organs of Soviet authority. But the ministry is obligated to keep an eye on the operation of the health care institutions that embody the greatest achievement of socialism—free, highly skilled medical care for every citizen of the country. From that standpoint, the correct and efficient use of expensive imported equipment—which, as we know, the country doesn't have enough of—acquires a great deal of significance.

Diagnostic centers are created especially so that the equipment will be used effectively. Fourteen such centers are already in operation—two of them in Moscow—

and it did not represent a great deal of effort for your correspondent to visit one of them. By the way, it is in them—and not in the fee-based cooperatives, which are inaccessible in price to many categories of workers—that we see the "perestroyka backed up by action."

Why on earth did they start transferring scarce imported equipment to fee-based cooperatives in Moscow? As the inquiry that was conducted showed, it had to do with poor organization of its use by the Moscow health care sector and certain clinics of scientific-research institutes. Instead of arranging for it to be used in two shifts—as it is done in many institutions—in a number of polyclinics, hospitals, and scientific-research institutes, the equipment is used after 4 PM by the cooperatives for a high price.

Moreover, in hospitals Nos. 71 and 19, in polyclinic No. 42, and in a number of other institutions, fewer examinations were done with that same equipment during the primary working hours than during the time made available to the cooperatives to use it. If you were to consider the outlay of resources for imported equipment, then it turns out that the greater part of them would be used specifically for fee-based diagnostics. Nor must one forget that cooperatives used expendable material and reagents of state health care institutions, purchased with the extremely limited monetary allocations of the USSR Ministry of Health. That is what the delegates of the physicians' congress were talking about when they were disturbed about the use by Moscow cooperatives of expensive imported equipment that is virtually nonexistent in many cities in Siberia and the Far East and in Kazakhstan, Uzbekistan, and other republics.

Your correspondent refers to statistical data that say that public opinion supports the creation of medical treatment-and-diagnostic cooperatives. But our mail indicates just the opposite. We receive a great many letters in which the workers of our country make valid claims that the health ministry is doing a poor job of monitoring the use of state property intended for free medical care. We are sending you some of those letters. That is why an order was issued that was directed at improving the operation of state health care institutions in terms of the use of diagnostic equipment. You will agree that this is not only the right of the USSR Ministry of Health, but also its duty.

The USSR Ministry of Health is not against cooperatives as such, but is for their creation in a sphere in which additional material investments and teams of specialists—in health and prevention, for example—are needed. But the appearance of cooperatives must not be the result of a lack of desire on the part of individual health care managers to properly organize the operation of their own institutions.

The letter published in OGONEK was described as the appeal of an emergency congress of medical cooperatives, although we feel that it should not be regarded as such, since it was a gathering of representatives of practically only Moscow cooperatives engaged primarily in diagnostics. In all, there were 137 of them registered for that period, of which only 64 were in operation. Whereas, for example, a large group of medical and rehabilitation cooperatives (149 from 95 of the country's cities) at its own founding congress, which created the Union of Medical Rehabilitation Cooperatives of the USSR, made an appeal to the USSR Ministry of Health of a completely different nature, which was published in issue No. 45 of the weekly NEDELYA (7-13 November 1988).

The USSR Ministry of Health has actively begun a collaboration with this union, a joint program of operation is being developed, and the question of introducing a system of state orders is being looked at.

I would also like to point out that the articles virtually ignore the development of fee-based state medical services that are being proffered by cost-accounting health care institutions. They are being created as a supplement to the existing system of free medical care. The prices in them, set by state agencies, are several times lower than those of the cooperatives.

In developing state cost-accounting polyclinics, we are actively facilitating the organization of additional use in that network of diagnostic equipment in short supply and other forms of medical care.

And in conclusion, several words about journalistic etiquette. In writing such a large piece (it was longer than what was published about the tragedy in Armenia), your correspondent should have presented not only the point of view of the cooperatives people, who are interested in personal gain, but also the good side of state health care service. Knowing of the devotion of OGONEK's editorial staff to the spirit of glasnost, we hope this letter is published very soon in one of the forthcoming issues of the journal.

In conclusion, I want to assure you that the USSR Ministry of Health, which firmly adheres to the principle of widespread glasnost, is ready to discuss on the pages of your journal any fundamental questions concerning perestroyka or the improvement of the protection of the health of the Soviet people.

Sincerely, Minister Ye. I. Chazov

Necessary Comments

We thank Academician Ye. I. Chazov for his prompt response to the journal article.

The article about the LiK cooperative was printed in OGONEK as a discussion. It was for that very reason that the title on the cover read: "The Medical Cooperative—For and Against."

And finally, about etiquette. It is in vain that Ye. I. Chazov reproaches OGONEK, leaving "to the conscience" of the author the remark "about the administration-by-injunction style" of leadership of the Ministry of Health. We merely quoted the addresses of delegates of the recently held All-Union Congress of Physicians. Those addresses are published in MEDITSINSKAYA GAZETA.

Drug Production Transfer to Ministry of Health Proposed

18400263a Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 10 Jan 89 p 4

[Article by I. Azhgikhin, doctor of pharmaceutical sciences, professor, under the rubric "A Clear Signal": "Where is the Centaur Galloping Off To"]

[Text] Who could say what the creators of the USSR Ministry of Medical and Microbiological Industry—that bureaucratic centaur—were thinking about when they charged it with the production of feed for cattle and medicines for people? The years go by, and remedies are not augmented. On the contrary, the problem today has become aggravated: indeed, with the organization of the new hybrid agency, the import of drugs has been cut back.

The efficiency of this ministry is laughably low. And it's not surprising that a substantial portion of the capital that should be used for the development and manufacture of medicinal products is spent on, for example, maintaining the bureaucratic apparatus.

And in general, we can honestly say today that a ministry of drugs has been created, but there are no modern drugs. Isn't that situation paradoxical? There is no nation in the world where medicinal preparations suffice without such agencies. The secret is simple: here the development of drugs is given much more attention than is, say, the development of "Shuttles" and other superequipment. And as a result, the pharmaceutical industry knows naught of the recessions and depressions that strike other industries.

In the United States, for example, more than 60,000 drugs are manufactured, with 20% of the product assortment replaced every five years. The USSR Ministry of Medical and Microbiological Industry, on the other hand, produces less than 2,000, including allochol [allokhol], urotropin, Calcex, besalol [besalol], and other "new products." And even they are frequently in short supply. True, the leaders of the industry are promising to create an abundance of drugs in the future. But the question is whether the people who need them now will live long enough to see that day.

Even the foreign drugs that have been purchased in small quantities are "growing a beard." We're talking about Doxium and Trental—which aid blood circulation in the microvessels of the heart and brain; Tagamet, De-Nol, and Gastrozepin—drugs for stomach diseases; Essenciale, Icorate [aykorat], and hundreds of others. But they are accessible only to those attached to the medical enterprises of the Fourth Main Administration in the USSR Ministry of Health.

Today there are virtually no areas above criticism in the country. And yet, the affairs of the pharmaceutical industry are hidden beneath a mantle of "frightful" secrecy. It's clear to everyone that "the emperor is naked"—all it takes is to drop in to any pharmacy. Certainly, the press has tried repeatedly to elbow its way behind the scenes at the ministry. But each time, it has provoked violent anger among the ministry's leaders, who stop at nothing: they fulminate against all who dare to hang the dirty wash out in public, and they get rid of the "disobedient ones" by hook or by crook. They publicly accuse journalists of slander if the latter tear away the ministry's veils. But the only thing the journalists are guilty of is that—in this period of glasnost and solidification and expansion of democratic principles in our life—they used the pages of the press to tell of the disastrous situation in our pharmaceutical industry.

Certainly, in the interests of truth, it must be noted that as of late the USSR Ministry of Medical and Microbiological Industry has begun to change the way it operates. An agreement has been reached with a Swiss firm on drug production, and the ministry people have begun holding press conferences. But these formal innovations, alone, hardly represent a way out of the impasse. You can't harness an ox up with a deer. Experts have long proposed transferring feed development and production to the USSR Gosagroprom, and drugs to the USSR Ministry of Health. Only the large scientific production associations that our health care sector has at its disposal have the competence to create new medicinal preparations. They have to be headed by major scientists and organizers and must use as fully as possible the potential inherent in domestic and world science. Otherwise, we will have the kind of monster centaur that will barely be able to gallop anywhere.

Measures to Increase Syringe, Dialyzer Production

18400263b Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 4 Jan 89 p 2

[Article under the rubric "The Newspaper Spoke Out. What's Been Done?": "Profit Versus Mercy"]

[Text] On 11 September 1988, beneath the headline "Profit Versus Mercy," we published critical reportage which spoke of problems in the production of medical equipment.

M. Sobolev, the deputy minister of the USSR Ministry of Medical and Microbiological Industry, said that the ministry had taken all the necessary measures to meet requirements for the manufacture of syringes and to create the capacities for producing about 300 million syringes a year.

The ministry has developed a set of measures, including the retooling of existing enterprises and the construction of new ones, in order to be able to completely supply the medical system by 1995.

As for the production of dialyzers and "artificial kidney" machines, the ministry reports that proposals for the creation of domestic equipment to produce such apparatuses and proposals for the construction of the requisite production facilities have been worked out since as far back as 1986. The USSR Council of Ministers—with its decree "On Measures for Increasing Production of Drugs and for Completely Meeting the Drug Needs of Treatment and Prevention Institutions, the Population, and the National Economy in 1988-1995"—has assigned the necessary tasks to the USSR Ministry of Machine Tool and Tool Building Industry and to the country's construction ministries.

At present, by decision of the directive organs, those operations have been accelerated considerably. As early as 1989, production capacities for manufacturing dialyzers will be increased by a factor of 1.7; by 1991, they will reach levels that thoroughly maintain the normal functioning of "artificial kidney" machines planned for manufacture by the USSR Ministry of Defense Industry.

Operations associated with increasing the manufacture of disposable polymer-based medical products on the products list assigned to the ministry are under the constant supervision of the industry management.

Child Mortality and Maternal Care Problems

18400264 Moscow PRAVDA in Russian 16 Dec 88 p 3

[Interview Professor Vladimir Ivanovich Kulakov, doctor of medical sciences and director of the All-Union Scientific Research Center of Health Protection of Mothers and Children, USSR Ministry of Health: "'Two Watermelons in One Hand'...: Professor V. Kulakov Reflects on the Problems Associated With Protecting the Health of Mothers and Children"; first three paragraphs are source introduction to article]

[Text] ***Is there anything more important than the birth of a healthy child? The answer, unquestionably, is no. But why then is the problem associated with the health of the expectant mother and the newborn still so far from being resolved? Proclaiming "All the best for our children," we nevertheless spend our days giving priority, in fact, to adults. And as a result, more than 50,000 infants die every year because they did not receive the proper medical care.***

We lose children under the age of 1 year 2.5 times more often than do the United States, England, and FRG and five times more often than does Japan.

As before, we are embarrassed to speak in public about the sexual ignorance of the population or about the shortage of contraceptives, as a result of which every year, more than 23,000 teenage girls not yet 17 years old terminate unwanted pregnancies, and the USSR is first among developed countries in the number of abortions per thousand women: for every 5.6 million births annually, there are 6.8 million abortions.

These and other problems make up the topic of our conversation with the director of the All-Union Scientific Research Center of Health Protection of Mothers and Children, USSR Ministry of Health, Doctor of Medical Sciences, Professor Vladimir Ivanovich Kulakov.

[Q]: **For many years, we hid and sometimes even juggled statistics about infant mortality and the number of abortions performed in the country. Is it true that, thanks to information supplied by the World Health Organization, the whole world was apparently aware of them anyway?**

[A]: In fact, such information was published neither in open sources nor in special sources. All articles underwent pertinent correction, and figures were removed from texts. They were replaced by the words "above," "below," "more than," and so forth. This, of course, resulted in even the specialists having no clear idea of what the infant mortality rate was.

It wasn't just them who didn't have the information, it was also the party and administrative organs. And whenever we would start a conversation on the catastrophic situation in this area, many considered our alarm to be unfounded. However, the situation became so serious that it attracted the attention of the Party Control Committe [KPK] of the CPSU Central Committee. Measures involving administrative action were taken. Some managers were punished, and resolutions and orders were circulated among institutions. But nothing constructive was done to right the situation.

Today we speak openly about these rather delicate questions that certainly affect everyone. In the last year and a half or so, there have been tangible advances. They are reflected in the slow but steady drop in infant mortality. The trend is clear, even though the statistical criteria have become stricter.

[Q]: **The criteria adopted in the USSR for evaluating the viability of a newborn are quite different from those that have long been accepted in other countries of the world. According to the WHO classification, a fetus weighing 500 grams after 22 weeks of gestation is considered viable. In the USSR, that weight must be 1,000 grams at a gestational age of 28 weeks. Isn't the reason for our**

persistent reluctance to accept the WHO norms that our children's departments are poorly equipped for bearing low-birth-weight newborns? Or is it done to "improve" the statistics?

[A]: We are not deceiving anyone. In the USSR and in a number of other socialist countries, those criteria differ somewhat from the criteria adopted by WHO. Moreover, all infants in our country who are born with a body weight of less than 1,000 grams get special care and are registered as such after seven days of life. In the Baltic region and Belorussia, in the Ukraine, and in several oblasts of RSFSR, infant mortality figures match those of developed countries like FRG, the United States, and France. In Tadzhikistan, Uzbekistan, and Turkmenia, however, the infant mortality rate still reaches 45-55 per thousand newborns. That makes the figures for the entire country high.

Among all the developed countries, the number of children who die in the first week of life represents 65-70% of the infant mortality; whereas in poorer regions, those children make up 30-35%. The rest die between one week and one year of age. The children die primarily from diseases of the respiratory organs, infectious diseases, and congenital anomalies. Often, death is due to poor sanitary conditions.

[Q]: **It's more like the absence of sanitary conditions. In Azerbaijan, for example, almost half the maternity hospitals do not have hot water or plumbing. In the years of Soviet power, as it was said on one of the boards of the Ministry of Health, only one maternity hospital was built in the republic that had relatively normal conditions, and it had the only disinfection chamber for the entire region. It's in this region that we find one of the highest mortality rates for mothers and newborns due to sepsis. The situation is no better in many other regions of Central Asia...**

But you still haven't answered the question: why are WHO criteria still not acceptable for us?

[A]: I repeat, we are doing everything we can to see that low-birth-weight infants survive, and we are trying to bring them up to a normal weight and condition. Unfortunately, however, we are poorly equipped with what it takes to care for such children. We have neither the monitoring equipment nor the domestically produced incubators that are absolutely necessary in the fight for their lives. The Hungarian incubators that we buy do not maintain the necessary temperature and are not fitted with automatic sensors.

We have to go abroad to buy dosing sensors for droppers, without which you can't infuse fluids into newborns, and needles for intravenous injections. As before, we don't have enough disposable syringes, not even for children's departments. We've begun producing them, but it will apparently take several years before the production output will begin to satisfy our needs.

Curtailing perinatal mortality requires eliminating, or at least reducing the probability of, intrauterine infection of fetuses and newborns. In 1988, the USSR Ministry of Health took an extremely important step to solve the problem by organizing in 25 regions of the Soviet Union enzyme immunoassay laboratories for prompt diagnosis both of bacterial infections and viral infections. The USSR Ministry of Health's Main Administration for the Protection of Mothers and Children named us as the training-and-procedures and scientific center for handling this important problem. And so a great deal of difficult work lies ahead.

[Q]: **We all know that there is an acute shortage of diagnostic equipment in the country. In this connection, we are keenly aware that a number of enterprises that manufacture medical equipment are refusing to fill orders that are, from their standpoint, unprofitable. The people at the Krasnogvardeyets plant, for example, do not want to make medical instruments that require large outlays of labor but fetch a small price. Moral duty is in conflict here with economic operation in the context of cost accounting, and, obviously, we need to find a way out of this situation...**

[A]: As for financial and technical support for our services, I would like to note that the newborn is, as it were, outside the law here—there is virtually no financing to maintain him. Allowance is made only for the mother's bed, but it's as if the newborn doesn't even exist. True, instead of 90 copecks a day, we are now allocated 1 ruble 50 copecks for drugs for each patient. But the primary problem has yet to be solved: why, it's virtually impossible to buy all the medications we need in the pharmacy administration. If we request 100 bottles of antibiotics, we get 50-60. It's as if many of our problems are so basic that even focusing attention on them is absurd. But solving the main problem—reducing infant mortality—is closely tied to these "trivialities."

Let me give you an example. For decades, we obstetrician-gynecologists have been fighting hospital infection in maternity hospitals. And although the necessity of using disposable bed clothes here was demonstrated long ago, it was not that long ago that we did not have the right to throw away repeatedly used bed clothes until after 3-5 years of use. Now, finally, we are allowed to destroy this dilapidated bed clothing after a year and a half. And right away, we get information about the reduction of infectious diseases in obstetrics facilities.

[Q]: **In a PRAVDA article, you complained that in your entire 30-year practice, you had not received one flaw-free domestically produced piece of equipment used to prevent the death of healthy children at birth. In fact, for decades, obstetrics and pediatrics have been the stepchildren of the health care system. Cardiology, microsurgery, ophthalmology have burst ahead. True, they didn't achieve success here without "best" equipment or the personal pull and energy of the leaders in the "crew." In view of the distressing situation in your field and the depressing state of prenatal care facilities and maternity hospitals, didn't**

you and your colleagues sound the alarm, didn't you knock on the doors of the offices in which the fate of appropriations and the redistribution of funds are decided by people quite far removed from the details of the problems in maternity.

[A]: You're right, we were quite apprehensive and ashamed to speak about those problems, as if they were personal problems. Unfortunately, though, even now, after sharp outbursts in the press, we don't always find support and real help when we approach many representatives of the party and soviet apparatus. The representatives of the party municipal organs, for example, have never once set foot here, in our center; and yet, we couldn't begin to list the organizational and purely economic difficulties.

[Q]: **Do you have specific suggestions, a program for reorganizing the service for helping mothers and children? Or, as it unfortunately often happens, has there accumulated merely a multitude of individual complaints about shortages and unsolved problems?**

[A]: Our plans? We plan to treat with state-of-the-art methods certain married couples suffering from infertility due to illness of the wife or the husband or, sometimes, to both. Such methods include the so-called extracorporeal fertilization of human egg cells. This involves fertilization of the egg cells outside the body, incubating them for one or two days, and then transplanting the embryo in the cavity of the uterus. This method has been mastered in our center. The first 17 children have been born, and 20 pregnancies are in progress.

Under our scientific and procedural guidance, another method of treating infertility is being introduced in our country—artificial insemination with the sperm of the husband or a donor. It is already being used in more than 10 large cities in the country, among them Moscow, Leningrad, Tbilisi, Tashkent, and Kharkov.

We are proposing that our center serve as the base for the organization of 16 scientific-and-practical "Materinstvo" complexes for treating infertility. Some 6,000-8,000 rubles are spent for the treatment of an infertile couple. They are treated for 8-10 years, and success is achieved in only 10-20% of the cases. But according to the system we have developed, a diagnosis can be established in 1.2-2 years, treatment can be conducted, and, as a result, 50-60% of the patients will have offspring. That translates to thousands of healthy, very wanted children.

We approached the USSR Ministry of Health with the request that they allocate us non-currency funds for acquiring hormonal preparations and set of equipment. But the matter hasn't moved an inch. Unfortunately, we are forced to purchase a great deal—from complex ultrasound echographs to vacuum test tubes with needles for taking blood. At the same time, we are attempting to save money by raising the efficiency of personnel and making only small increases in staff. In addition, we are proposing that a clinic like the "Mikrokhirurgiya glaza" interbranch scientific and technical complex be opened at our center and that the equipment we need be bought with the money it earns.

Thus, if the present treatment of infertility—and we have nearly seven million married couples who suffer from this—costs the country an astronomical sum (nearly 10 billion rubles a year), with examination and treatment with our techniques, it will cost a fourth of what it does now. However, in spite of the conclusiveness of our arguments, our attempts at making business contacts with the organizations responsible for the production of domestic equipment for our sector have not been successful. The organizations say there is a shortage of skilled specialists and that producing medical instruments is not profitable.

Organizations providing family planning services could be set up without the need for large, special outlays by merely integrating the health care services that are actually engaged in rendering medical aid for controlling the birth rate. In light of the fact that the cost of performing an artificial abortion is estimated to be a minimum of 25 rubles, the provision of family planning would result in a considerable savings of money in the health care budget. The lack of proper attention given to the problem, plus the sexual ignorance of the population, has resulted in artificial abortion having become more or less the primary means of controlling the birth rate in our country.

[Q]: **It's no news to anyone that at school and in the family, the words "abortion," "contraceptives," and "sex" are enunciated only in fear and with the shyness of a monk. However, the children themselves have long, and quite one-sidedly, been versed in the many nuances of sexual life. Perhaps it makes sense to learn from the experience of many countries, where sex-education brochures and condoms can be bought anywhere, even at newspaper stands. Now, with the spread of AIDS, the whole world is unembarrassedly and unsanctimoniously advertising these types of protection and is placing the brunt of its hope on them for the prevention of infection. Whereas we rest our hopes on two low-output enterprises that make products whose quality can in no way guarantee the reliability of protection against either pregnancy or the virus. And the quantity that's produced is ridiculous—about four condoms for every representative of the male segment of the country's population a year.**

[A]: We just purchased a batch of contraceptives in Hungary, and the firm gave us an excellent booklet about their use, a booklet a great many copies of which were published there. It wouldn't seem like a complex problem, but we—the Center for Health Protection of Mothers and Children—do not have the right to publish our own literature, and finding an outside concern that makes copies is difficult. As a result, our suggestions remain unrealized, and in the USSR there is, to this day, not one sensible, public brochure on means of protection.

[Q]: **But once again, what good is a brochure if the recommendations inside it can't be followed?**

[A]: True, getting the proper contraceptive is actually difficult. Take, for example, the intrauterine spiral contraceptives produced by a Kazan plant. They don't meet modern requirements, and they discredit the method accepted throughout the world. Now, after a long preparation, they have begun to manufacture the intrauterine spirals with traces of copper. They don't have the drawbacks that the first ones had. But we are already sounding the alarm so that the experimental batch isn't merely a first and unique batch, since the model has been introduced for several years now.

Hence the so widely used artificial abortion. In a number of union republics, there is a steady growth in the number of these operations. Every year, we lose hundreds of women from abortions...

[Q]: **While nine scientific research institutes and 15 departments of obstetrics and gynecology conduct scientific research on the problem of abortion! But are the postulates advanced by our scientists always realistic? Do they always take into consideration the evil of the day, as they call it?**

[A]: A Turkmen saying goes: "You can't hold two watermelons in the same hand." For many years, we extolled the virtues of having many children, and we encouraged and awarded the heroic work of women who gave birth to ten or more children. But specialists are well aware that a woman's body exhausted from frequent births cannot handle such an excessive load. Many children born 1.5-2 years after another birth are poorly developed physically and mentally.

In the Bukhara Oblast, for example, the interval between births in more than half the women did not exceed two years, and every fourth woman had given birth twice in the same year.

Is it at all possible for a modern working woman to raise five or more healthy children when today 30% of the 9.4 million people working in harmful production facilities are women? Some 270,000 women are engaged in heavy physical labor...

[Q]: **And so now, we've gotten to the main thing: there is no interconnection between the links of a closed chain—the health of the woman, pregnancy and birth, child care. We can't do without the government's taking a serious approach to the matter. Obviously, in the future, the family physician, who will know of all the hereditary problems of the family and who will foresee possible complications, will be able to keep all these stages under control. But today, the situation is like this: nearly 30% of all children are born with some pathology. They find themselves in conditions that are not very comfortable, so to speak. Pediatric specialists, for example, are convinced that an infant who is separated from its mother within a few minutes after it comes into the world becomes anxious and cries and loses weight quickly. Abroad, this factor seems to be taken into consideration...**

[A]: We often hear complaints that the women in our maternity hospitals are isolated—the husband and relatives can't be with them—and that we tear the infants from the mothers and take them to another department, sometimes to another floor. But after all, we can't compare the typical design of our maternity hospitals with that of similar hospitals in other countries, where the woman, along with the infant and the husband, who is even allowed to be present at the birth, are placed in an isolation unit. Here everything is provided for carefully attending to and monitoring the condition of the mother and child, and there is no danger of infection being transmitted. We will live to see such conditions, and we will be glad to not separate the happy family. All these problems, without a doubt, trouble us and require prompt solution.

[Q]: **The traditional way of saving a pregnancy in habitual abortion—limiting mobility for several months—is ineffective and not without dangers. But for several years now, in Riga, they have been successful with a simple, very effective method: when there is a threat of a miscarriage, the pregnant woman is injected with lymphocytes from the husband, and an immune reaction takes place, and, as a result, women who have had as many as 18 miscarriages, give birth to healthy babies. I know that many physicians are skeptical about this method, even though they advance no convincing arguments against it.**

[A]: I would like to note that the development of the immunological method of treating habitual abortion by injecting the husband's lymphocytes began in our very center at the very end of the 1970s. And now the staff members of the clinical immunology laboratory and the aborted pregnancy department are not only actively using the method in their clinical practice and introducing it in other institutions of the country, but also conducting in-depth scientific studies to identify at the molecular level the cellular mechanisms of this effective therapeutic technique. What's more, in the coming months, the center is ready to present new scientific results on the use of this method of immunocytotherapy in other fields of obstetrics and gynecology practice.

[Q]: **I want to return again to the problem of terminating pregnancies. A great many abortions performed in our country are illegal. Often, this happens because of the apathy of physicians and in violation of legislation that a woman can have this operation anywhere she wants, no matter where her place of residence. Look, a woman resorts to this tortured and, sometimes, tragic solution as a result of a whole series of circumstances and because she does not want her relatives or her friends at work to know about it. In an effort to keep it a secret, she takes a risk—extrahospital abortion. In this country, every year, more than 600 women die from abortions—especially criminal abortions. Maybe what moves them to take this**

step is also a fear of pain, which physicians in a hospital don't think very much about, treating those who've come for the abortion with disdain and sometimes even with "educatory sadism": experience these tortures, they say, and they'll think twice next time.

[A]: At the same time, by order of the USSR Ministry of Health, abortions are now permitted in later stages of pregnancy: up to 28 weeks, if there are medical or social reasons. This will reduce considerably the number of criminal abortions.

A decision has been made to improve the conditions attending the location of special departments, and additional anesthesiologist-physician positions have been created...

There is still another important aspect: the family planning problem can't be solved without qualified medical-and-genetics counseling. Every year, nearly 200,000 children are born with a hereditary pathology, and a fourth of the pregnancies don't come to term, for genetic reasons. The USSR Ministry of Health has already issued four orders regarding the organization of medical-and-genetics counseling units, but, as before, we don't have enough medical-and-genetics counseling specialists. The country needs 7,000-10,000 geneticists, but right now we have only about 2,000. For intrauterine diagnostics, we need special reagents and ultrasound instruments, which are purchased abroad.

[Q]: **Nevertheless, in Yaroslavl, Kharkov, Ivanovo, and a number of other cities, the Brak i semya [marriage and the family] service is active. In Kharkov, they began with the creation of a well-equipped center for medical and genetics counseling, and today they are already going out into rural areas and conducting examinations, identifying risk groups and using expensive equipment as much as possible in the process. They have set up special offices in oblast and rayon hospitals. The ultimate aim of the work, as one Kharkov resident puts it, is to lower the infant mortality rate.**

[A]: Our medical-and-genetics counseling system is among the worst in the world. And yet, I am convinced that we can, in a short time, create a regional network of medical-and-genetics counseling units and provide future physicians with a sufficiently broad outlook and a professional alertness.

[Q]: **To what degree are the drug addiction and toxic substances abuse that have been noted in recent times reflected in the children being born?**

[A]: Right now, there is a trend toward an increase in the number of premature births and low-birth-weight babies. Take the notorious smoking habit. If the pregnant woman smokes just one cigarette a day, it reduces the weight of the fetus. The number of deformities associated with damage to the central nervous system in children born to drug addicts and people who use toxic substances has grown. You have to see these paralyzed infants, bedridden forever, to fully comprehend how guilty their parents are. As a rule, they are given up to children's homes, doomed to a lifetime of suffering.

According to data provided by pediatricians, the infant mortality rate is 2-3 times higher among the children of women suffering from alcoholism. When you witness the heart-rending scenes in which the mother sees, for the first time, the underdeveloped, sick infant, and you explain that the cause of it was her or her husband's improper behavior during the pregnancy, or pills, or alcohol, you just wish that those who, after swallowing all kinds of trash or after smoking, are going to begin tomorrow bearing the next misshapen creature could be there, too...

Today, 40% of the appropriations for health care are allocated for the protection of the health of mothers and children. Many industrial enterprises are beginning to actually take under their ward maternity hospitals, and a number of vacated locations are being converted into maternity hospitals. In the United States, 25 intrauterine fetal diagnostics laboratories purchased, and dozens of diagnostic centers hare being set up all over the country. They will examine adults and children both. Negotiations involving the creation of joint enterprises are under way with Finland and Italy for the production of medical equipment, including equipment needed in pediatrics.

Physician Shortage in Polyclinics

18400266 Moscow MOSKOVSKAYA PRAVDA in Russian 20 Dec 88 p 3

[Article by G. Kochetkova, deputy director, Lyublin Rayon Department of Health, N. Makarova, physician-inspector, Kuntsevo Public Health Administration, V. Smirnova, rayon pediatrician, Volgograd Public Health Administration, and V. Soskov, MOSKOVSKAYA PRAVDA correspondent: "Standing in Line for Health Care"]

[Abstract] An informal survey of the adult and pediatric polyclinics in Moscow points to a now-chronic case of understaffing by physicians and mismanagement. Although there are exceptionally managed polyclinics where everything is as it should be—a high degree of patient satisfaction and excellent morale among the staff—the situation is, for the most part, far from satisfactory. In many cases poor living conditions cause physicians to look for other places of employment, and many have gone over to cooperatives because of higher earnings. As a result, instead of providing a support service for the health system, the cooperatives have been transformed into legal profit-making fee-for-service establishments. It has become evident that much of the disarray is due to poor scheduling of patient hours and the fact that sick-leave permits must be renewed every 3 days. The time has come to allow physicians to issue 10-day sick leave certificates on the basis of their own professional recognizance. Such reforms, in conjunction

with better time management, less cumbersome record keeping, and better scheduling of patients to take normal working hours into account, would go a long way to alleviating the scandalous state of health care delivery.

Eye Microsurgery Center Opens in Volgograd

18400268 Moscow SOVETSKAYA ROSSIYA in Russian 26 Dec 88 p 3

[Article by V. Drobotov, SOVETSKAYA ROSSIYA special correspondent; "Deluxe on Display"]

[Abstract] The eighth eye microsurgery center in the USSR has recently been opened in Volgograd, serving as a fitting representative of the fact that Soviet ophthalmology is at the cutting edge of advances in this branch of medicine. V. P. Sokolov, the director of the center, takes pride in his institution, which is organized along the lines of suites rather than wards and is capable of performing about a hundred eye operations per day, thanks to an advanced surgical conveyer concept developed by S. N. Fedorov in Moscow. The center operates on the basis of economic cost accounting, meaning that patients pay for some of the services (although the operations themselves are free), and the medical specialists have to earn their salaries. Although the building itself was completed on time and meets the latest standards in construction engineering (it was built by a Finnish concern), the grounds were the responsibility of Soviet contractors and are proof of mismanagement and neglect. At one point, the center was hard to reach because of delays in completion of the roadwork. In addition, suitable apartments were lacking for the physicians, a fact which itself was responsible for the loss of some staff members. Nevertheless, progress is being made, and case load is increasing. Discussions are also under way about accepting patients from abroad.

New Surgical Center Director Discusses Perestroyka

18400269 Moscow SOVETSKAYA ROSSIYA in Russian 26 Dec 88 p 3

[Interview with B. A. Konstantinov, director, All-Union Scientific Surgical Center, USSR Academy of Sciences, under the rubric "Medicine for Everyone"; "Life's Pressures"]

[Abstract] One of the most important aspects of perestroyka is that of economics, i.e., the current emphasis on cost effectiveness and economic self-sufficiency. An economically responsible approach to health care and medical research will benefit the entire society through emphasis on competence and efficiency and will force the medical establishment to utilize its resources on a cost-benefit basis. To date, through stagnation and lack of foresight, many seminal contributions made by Soviet researchers have fallen by the wayside or have been underutilized, with detriment to prestige and the quality of health care being provided. In those cases where the Soviet medical industry cannot meet the demand for technological innovations, licenses can be issued to foreign firms and can provide valuable currency. However, this type of perestroyka requires good will and a change of attitude toward society and professional responsibility. New curricula will have to be created in medical education to instill in the new physicians traits and attitudes that will entirely alter the state of Soviet medicine, with greater emphasis on innovation, risk-taking, individual responsibility, and cost-effectiveness.

Reducing Temporary Disability Among Agricultural Workers with Mass Health Screening

18400285 Alma-Ata ZDRAVOOKHRANENIYE KAZAKHSTANA in Russian No 10, Oct 88 pp 15-16

[Article by L. L. Karp and L. Ye. Sviridova, Department of General and Social Hygiene and Organization of Health Care, Tselinograd Medical Institute]

[Abstract] The average amount of work lost due to illness is 11-12 days per year per worker in the Soviet Union. The researchers set out to study the temporary disability due to illness and injury among sovkhoz workers in the Tselinograd Oblast. The level of morbidity resulting in temporary disability was found to be at 32.8 incidents per 100 workers, with a total of 642.6 workdays lost. The number of incident was lower for men than for women (31.9 versus 36.3), but the number of days lost was higher (646.9 versus 626.5). Respiratory illness accounted for 28.4% of the illnesses; injury and poisoning, 17.0%; diseases of the digestive organs, 16.7%; musculoskeletal system and connective tissue, 9.5%; and skin and subcutaneous cellular tissue, 7.9%. Those five areas accounted for 72.4% of all illness resulting in loss of work. In terms of days of work lost, injury and poisoning accounted for 22.5%; respiratory disease, 16.7%; infectious and parasitic diseases, 14.5%, digestive tract problems, 11.8%; and musculoskeletal and connective tissue problems, 7.3[5]. Together, they accounted for 72.8% of all the days lost. The researchers feel that health screening will eliminate a good deal of the illness cited.

Using Simulation Modelling to Analyze the Activity of Personnel Who Oversee Automatic Equipment

18400320 Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: PSIKHOLOGIYA in Russian No 4, Oct-Dec 88 (manuscript received 11 Dec 87) pp 12-22

[Article by Yu. O. Slivnitskiy and S. A. Goryainov]

[Abstract] The principal activity of personnel overseeing an automatic system consists in keeping the system itself or its backup components ready to perform preassigned tasks. One aspect of keeping the system in order involves, for example, making functional checks of system hardware. This paper discusses a simulation model the authors developed for a subsystem for performing functional checks of the hardware of an automated system. A simulation model (SM) is a logical, mathematical description of a system. The description can be studied in experiments run on a digital computer, which makes it possible to draw conclusions about the effectiveness of design solutions pertaining to the system, without having to physically reconstruct, or intervene in, the process of the system's actual operation. Such modelling is not widely used in psychological practice, because special methods must be developed to obtain the characteristics of the work activity that represent the baseline data. The model the authors propose is meant to assess design solutions that involve the organization of the activity of personnel who perform functional checks; the solutions satisfy certain norms for total time spent searching for the causes of malfunctions in subsystems placed in backup configurations. The focus of the paper is on an analysis of the tasks associated with functional checks and on the structure of the model's algorithm. The authors examine the classification of two types of technical diagnostics (instrument and machine diagnostics). The baseline data required is given in detail, and block diagrams are provided for the principal algorithm and a subalgorithm. Figures 2, references 12 (Russian).

UDC 577.391:612.015.3

Radioprotective Effects of Synthetic Analog of Prostaglandin F_2 Estrophane

18400183c Moscow RADIOBIOLOGIYA in Russian Vol 28 No 4, Jul-Aug 88 (manuscript received 4 Nov 87) pp 530-532

[Article by Yu. N. Chernov, M. V. Vasin, L. A. Semenova, Voronezh State Medical Institute imeni N. N. Burdenko]

[Abstract] In view of the fact that certain prostaglandins have been shown to possess moderate radioprotective effects, trials were conducted with estrophane (Spofa, Czechoslovakia), a synthetic analog of $PGF_{2\alpha}$, to determine its possible radioprotective qualities. The trials were conducted with female (CBA x C57/Bl/6)F_1 mice and male and female Wistar rats to assess the effects of intraperitoneal estrophane (0.02-5 mg/kg) given 5, 30, and 60 min before gamma-irradiation (8.5 Gy for rates, 9.5 Gy for mice). The resultant 30-day survival figures showed that estrophane improved the survival rate of 33.6-35.7 percent when administered 5 minutes before irradiation in the case of both species. It was ineffective when given 30 or 60 minutes before irradiation. Furthermore, the therapeutic or radioprotective effect became evident with doses of 0.1 mg/kg or higher in a dose-effect relationship. References 9: 5 Russian, 4 Western.

UDC 577.391:621.386.86:611.61

Effects of Gammaphos and Mercamine on Functional Capacity of Kidneys in Whole-Body-Irradiated Rats

18400183d Moscow RADIOBIOLOGIYA in Russian Vol 28 No 4, Jul-Aug 88 (manuscript received 8 Jul 87) pp 532-536

[Article by Ye. I. Sukhacheva, D. I. Semenov, V. M. Masna and G. A. Menshikova, Institute of Plant and Animal Ecology, Urals Department, USSR Academy of Sciences, Sverdlovsk]

[Abstract] The extent of radiation injuries in whole-body irradiation has been shown to be mitigated by shielding the kidneys, with a corresponding improvement in the survival rate of irradiated animals. To further define the renal effects of radioprotective agents, an assessment was conducted on glomerular filtration and renal hemodynamics in female Wistar rats (227.7 +/- 7.8 g) treated with gammaphos or mercamine prior to gamma-irradiation. The animals received intraperitoneal gammaphos (300 mg/kg) 30 minutes before gamma-irradiation (7.4 Gy) or mercamine (340.5 mg/kg) 15 minutes before irradiation. Mercamine was shown to have profound adverse effects on the glomerular filtration rate and renal circulatory parameters. The combination of mercamine with irradiation was found to further exacerbate renal dysfunction and the negative effects of irradiation on the kidneys. Control animals treated with gammaphos showed progressive development of dysfunctional pathology in terms of renal demodynamics and an increase in secretroy and reabsorptive functions in the following 30 days. However, glomerular filtration rate remained unaltered. After 210 days, renal performance recovered to normal levels. Rats subjected to a combination of gammaphos plus irradiation showed essentially similar changes to animals unprotected with gammaphos with the exception of earlier recovery. Gammaphos-treated rats showed normal glomerular filtration by day 16, whereas normal glomerular filtration was delayed to day 90 in the gammaphos-untreated group. However, after 210 days glomerular filtration rate in the gammaphos + irradiation animals was below the rate in the unprotected rats. References 25: 11 Russian, 14 Western

UDC 577.391:612.119.598.13

Effects of U-2 Fraction of Splenic Extract of Central Asian Tortoise on Mammalian Hemopoiesis

18400183e Moscow RADIOBIOLOGIYA in Russian Vol 28 No 4, Jul-Aug 88 (manuscript received 6 Jan 88) pp 536-539

[Article by A. A. Turdyyev, Ye. A. Sokolova and I. G Bogdanova-Berezovskaya, Institute of Biochemistry, Uzbek SSR Academy of Sciences, Tashkent]

[Abstract] Trials were conducted on the hemopoietic effects of splenic extracts of the Central Asian tortoise in irradiated mice. Studies with female (CBA x C57B1/6)F_1 mice x-irradiated with a 6.5 Gy dose and treated in 2 hours with either the whole extract or its U-2 fraction (100 µg, i.p.) showed that the treatment led to a statistically significant elevation of endogenous splenic hemopoietic colonies. The U-2 Fraction, furthermore, was far more efficient in leading to recovery of hemopoietic capability than the whole extract. Morphological analysis of the colonies demonstrated that more than 60 percent were of the erythroid type. Additional studies with lethally irradiated female C57B1/6 mice transplanted with syngenic bone marrow cells from donors subjected to various procedures (irradiation, U-2 Treatment, etc.) showed that U-2 promoted formation of bone marrow CFU's. Preincubation in vitro with U-2 of bone marrow cells derived from irradiated mice (YGy) also led to an increase in the number of exogenous colonies in the spleens of recipient mice. Thus, the therapeutic efficacy of the U-2 fraction may be due to a direct effect on the proliferative (mitotic) activity of bone marrow stem cells and enhancement of their migration into the spleen. Reference 9: 7 Russian, 2 Western.

UDC 577.391:591.48

Early Changes in Activities of Oxidative and Hydrolytic Enzymes of Cerebral Cortex Following Gamma-Irradiation and Treatment with Mexamine and Estrophane (Synthetic $PGF_{1\alpha}$ Analog)

18400183f Moscow RADIOBIOLOGIYA in Russian Vol 28 No 4, Jul-Aug 88 (manuscript received 2 Oct 87) pp 539-542

[Article by V. F. Lyshov, M. V. Vasin and Yu. N. Chernov]

[Abstract] Therapeutic trials were conducted to assess the effects of mexamine (5-methoxytryptamine) and estrophane on cerebrocortical alkaline phosphatase (AP), succinate dehydrogenase (SDH), and lactate dehydrogenase (LDH) in gamma-irradiated mice. The studies were conducted with female (CBA x C57B1/6)F_1 mice subjected to 200 Gy (400 Gy/min) gamma-irradiation of the head area, treated intraperiotoneally with either mexamine (30 mg/kg) or estrophane (0.5 mg/kg) 5 min before irradiation. The control animals showed a moderate increase in the activity of LDH by 15 percent within 10 min of irradiation, without any changes in the activities of SDH or AP. Pre-treatment with estrophane abolished the rise in LDH activity, while mexamine had no effect on the pattern of activity. One hour after irradiation there was significant depression of AP activity (by 24.4 percent). After 2 h, AP continued to be depressed (by 17.9 percent), while estrophane was without effect. Both agents acted to restore AP activity to normal baseline values. These observations were interpreted to indicate that both agents facilitated the onset of adaptive mechanisms directed at improving regional vascular transport and delivery of nutrients to the brain in radiation damage. References 12: 6 Russian, 6 Western.

UDC 577.391;621.386.86

Radioprotective Effects of Natural Carotene-Containing Preparations: Testing Beta-Carotene on White Rats

18400183g Moscow RADIOBIOLOGIYA in Russian Vol 28 No 4, Jul-Aug 88 (manuscript received 2 Nov 87) pp 542-544

[Article by M. M. Vilenchik, T. I. Gikoshvili, A. M. Kuzin, Yu. I. Moskalev, S. V. Stepanov, A. Ye. Koklin, S. M. Bobneva and V. I. Kondratenko, Institute of Biological Physics, USSR Academy of Sciences, Moscow; Institute of Biophysics, USSR Ministry of Health, Moscow; Krasnodar Combine of Biochemical and Vitamin Preparations imeni K. Marx]

[Abstract] Therapeutic trials were conducted on albino rats with a Soviet preparation of beta-carotene derived from Blakslea trispora. Male Wistar rats (140-160 g) were treated either subcutaneously or intragastrically with 0.1 ml beta-carotene (2 mg beta-carotene/ml vegetable oil) 19 and 4 h before 8 Gy Gamma-irradiation, and the survival was rate monitored for 30 days. Similarly, outbred female rats (180-230 g) were treated with beta-carotene before and after irradiation. The graphically presented results showed that the survival rate for untreated male rats was 10 percent at 30 days. The subcutaneously treated male rats showed about a 30 percent survival rate, and the animals treated per os, a 50 percent survival rate. The 30-day survival figure for the untreated female rats was 5 percent, and for the beta-carotene-treated females, 40 percent. These observations underscore the radioprotective efficacy of beta-carotene, an agent recognized for its safety, with the radioprotective efficiency attributed to scavenging of active oxygen radicals. Figures 1; references 10: 9 Russian, 1 Western.

UDC 591

Mechanism of Radiation-Induced Interphase Death of Thymocytes

18400209a Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 303 No 3, Nov 88 (manuscript received 13 May 88) pp 742-745

[Article by Yu. N. Korystov, L. Kh. Eydus, V. V. Shaposhnikova and O. R. Dobrovinskaya, Institute of Biological Physics, USSR Academy of Sciences, Pushchino, Moscow Oblast]

[Abstract] Thymocytes derived from 140-160 g male Wistar rats were used in a study on the mechanisms of interphase death of irradiated lymphoid cells. The study was based on the previous observation that interphase death decreases with dilution of an irradiated cell suspension. Determination of the death kinetics of thymocyte suspension (10^5 to 2 x 10^7 cells/ml) subjected to gamma-irradiation with a 10 Gy dose showed that after 6 h approximately 75 percent of the cells in the 2 x 10^7 cells/ml suspension were dead. The death rate for the 3 x 10^5 cells/ml suspension was less that 25 percent. Dilution of the cell suspensions after irradiation markedly reduced the death rate, while concentration of dilute suspensions resulted in an increase in the death rate. Similar studies with low and high concentrations showed that concentration rather than the dosage of irradiation was the key factor in cell death: 4 x 10^5 cells/ml cell suspensions showed survival of the majority of the cells even after irradiation with a 100 Gy dose after 24 h, with a proportional reduction in survival as the cell concentration increased. These findings were interpreted to indicate that thymocytes, per se, are relatively radioresistant. The fact that close contact appears to be responsible for cell death in the interphase after irradiation was attributed to, on tentative grounds, activation of killer cells that are inactive in the normal thymus. Figures 3; references 15: 2 Russian, 13 Western.

UDC 575.224.4

Radioprotective Efficacy of Antioxidants in Gamma-Irradiated Wheat Seeds

18400227 Kiev TSITOLOGIYA I GENETIKA in Russian Vol 22 No 5, Sep-Oct 88 (manuscript received 9 Mar 87) pp 60-61

[Article by M. Sh. Babayev, Azerbaijan State University, Baku]

[Abstract] In light of the growing danger of radioactive contamination of the environment, trials were conducted with the novel antioxidant fenozan, a representative of sterically-hindered phenols, to evaluate it as a potential

radioprotective agent. The studies were conducted with the soft winter wheat Kavkaz, with the seeds subjected to gamma-irradiation from a Co-60 source at a dose of 100 Gy. At various times after irradiation the seeds were treated with 0.1 or 0.25 percent fenozan solutions and allowed to germinate, and the percentage of cells with chromosomal aberrations was determined in the anaphase of the apical meristem of the main rootlet. The data showed that the effectiveness of fenozan in limiting chromosomal aberrations was directly related to the lag time between irradiation and exposure to fenozan, with maximum benefit derived when the elapsed time was 8 h. In that case the number of cells with chromosomal aberrations was reduced to essentially baseline levels (2.10 percent control, 13.54 percent with irradiation; 3.60-3.99 percent with irradiation + fenozan). References 6 (Russian).

UDC 578.833.26:578.74].04:578.245.4

Inhibition of Reproduction and Dissemination of Tick-Borne Encephalitis Virus by Vertebrate Immunity Against Tick Antigens

18400228 Moscow MEDITSINSKAYA PARAZITOLOGIYA I PARAZITARNYYE BOLEZNI in Russian No 5, Sep-Oct 88 (manuscript received 13 Aug 88) pp 78-81

[Article by N. P. Mishayeva and V. I. Votyakov, Belorussian Scientific Research Institute of Epidemiology and Microbiology, Belorussian SSR Ministry of Health, Minsk]

[Abstract] Experimental studies were conducted with white mice, guinea pigs, and rabbits to ascertain the role of antibodies directed against tick salivary antigens in the outcome of vertebrate infection with the tick-borne encephalitis virus (TBEV). The experimental approach utilized induction of immunity against the salivary components by letting uninfected Ixodes ricinus and Dermacentor andersoni ticks feed on the animals. Subsequently, TBEV-bearing ticks were allowed to feed on the same animals. The results demonstrated that animals with immunity against the salivary antigens were less susceptible to infection by TBEV in comparison with a cohort of animals lacking antibodies against the components of the tick saliva. This fact was evident in the respective survival rates. In the case of mice, for example, possessing antibodies against I. ricinus saliva, the survival rate was 88.1 +/- 3.97 percent, versus a control rate of 27.1 +/- 4.51 percent. The analogous date in the D. andersoni study were 79.0 +/- 3.20 percent and 33.0 +/- 39.5 percent (again, $P>0.001$). The increased survival rate was correlated with a lower level of viremia. In animals with anti-tick immunity the levels of viral titers in the blood were 1.3 to 2.8 log LD_{50}/0.03 ml units lower than in the control animals. Analogous data were derived from the guinea pigs and the rabbits. This form of immunity, however, was ineffective when the animals were injected with the virus. This fact indicates that the antibodies served to 'encapsulate' TBEV within a salivary antigen-virus complex and facilitate immune clearance. In addition, infection of uninfected ticks feeding on immune animals exposed to infected ticks was also reduced ($P>0.01$ to >0.05) vertebrate immunity to tick salivary antigens in the epidemiology of TBEV. References 8: 4 Russian, 4 Western.

Concentrating and Purifying Newcastle Virus by Means of Microfiltration and Exclusion Liquid Chromatography

18400325 Bratislava ACTA VIROLOGICA in Russian Vol 32 No 4, Jul 88 (manuscript received Dec 86; in final form 15 Jun 87) pp 353-357

[Article by A. I. Krashenyuk and T. I. Goretskaya, Leningrad Scientific Research Institute of Vaccines and Sera, USSR Ministry of Health, Leningrad; All Union Scientific Research Veterinary Institute of Aviculture, Leningrad]

[Abstract] In a study of the possibility of concentrating various strains of Newcastle virus with microfiltration and purifying the virus suspension with exclusion liquid chromatography on macroporous glass with a pore diameter of 200 nm, the authors examined three strains of the virus: La-Sota, B_1, and Bor-74. They used virus-containing allantoic liquid (VAL) of 10-day-old infected chick embryos. The virus suspension was concentrated 17-20-fold and judged to be free of trace proteins of the liquid. Low titers of hemagglutinating activity in the filtrate (1:2-1:8) were due to free hemagglutinin being entrapped in the filtrate. Two strains of the virus demonstrated an extremely high level of hemagglutinating activity, which may have been associated with the removal of hemagglutinin inhibitors in the microfiltration process. The authors assert that their data suggest that the viral strains have differing sensitivities to hemagglutinin inhibitors. Hemagglutinating activity values for the viruses in the chromatography were 5.1% for the La-Sota strain, 4.7% for the B_1, and 32.8% for the Bor-74. Peak separation criterion values (the ratio of the difference in peak and trough heights to peak height) were 0.41, 0.80, and 0.81, respectively. The differences in the values are thought to be due to the presence of VAL components comparable to virus hydrodynamic dimensions. Peak protein concentrations (in γ/ml) were 54.3 for La-Sota, 99.47 for B_1, and 215.0 for Bor-74. The chromatographic distribution of hemagglutinating activity showed that the virus washed from the column with one peak, probably because the components of the second peak (free hemagglutinin) were removed with the microfiltration. Figures 1, references 14: 10 Russian, 4 Western.

First Bulgarian-Soviet Symposium on 'Free Radicals and Biostabilizers'

18400244c Moscow BIOKHIMIYA in Russian Vol 53 No 9, Sep 88 pp 1578-1579

[Article by Ye. A. Servinova, V. Ye. Kagan and A. A. Boldyrev]

[Abstract] The First Joint Bulgarian-Soviet symposium entitled "Free Radicals and Biostabilizers" was held on 23-26 November 1987, in Sofia. The meeting was a tribute to long-standing Soviet-Bulgarian cooperation and friendship and was sponsored by the All-Union Biochemical Society of the USSR and the Bulgarian Academy of Sciences, as well as a number of other Bulgarian institutions. The meeting was attended by more than 150 specialists in free radical biology from the USSR, Bulgaria, East Germany, Hungary, and Czechoslovakia. The programs consisted of the presentation of 41 papers, extensive discussions, and over 100 poster presentations. The information dealt with at the meeting covered the full spectrum of free radical biology and chemistry and was classified into four major themes for organizational purposes: Mechanisms of Free Radical Reactions in Biomembranes, Effects of Antioxidants on Biological Membranes, Interaction of Free Radicals and Biostabilizers with the P-450 Cytochrome System, and Free Radicals and Biostabilizers in Medicine. Of particular interest was the talk on a novel class of antioxidants—histidine-containing dipeptides—given by Academicians S. Ye. Severin and A. A. Boldyrev (USSR).

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